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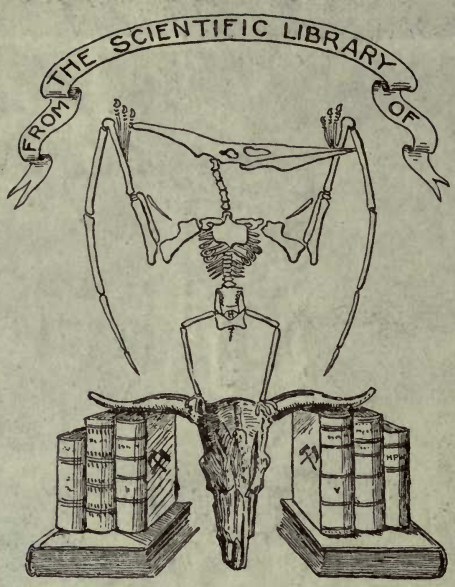

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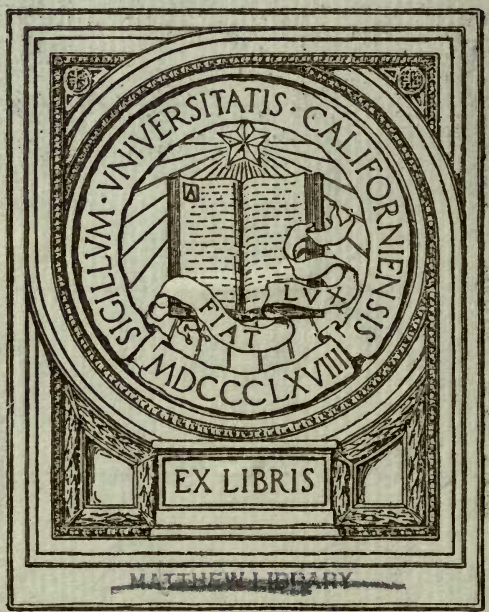

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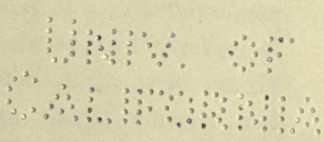

VOL. I.

ARTIODACTYLA,

FAMILY BOVIDÆ,

SUBFAMILIES BOVINÆ TO OVIBOVINÆ

(CATTLE, SHEEP, GOATS, CHAMOIS, SEROWS, TAKIN, MUSK-OXEN, ETC.).

By R. LYDEKKER, F.R.S.

LONDON:
PRINTED BY ORDER OF THE TRUSTEES OF THE BRITISH MUSEUM.

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PREFACE

THE present Volume, which is the first of a new Catalogue of the specimens of Ungulate Mammals in the Collection of the British Museum, deals with a part of the great family Bovidæ, including the Oxen, Sheep, Goats, Serows, and related Ruminants. Its preparation has been entrusted to Mr. R. Lydekker, F.R.S., who for many years has not only been responsible for the care of the Mammals exhibited in the public Galleries of the Museum, but deserves most of the credit for their present condition and arrangement. A very large proportion of the space available for Exhibition purposes is occupied by the Mammals forming the subject of this Catalogue.

The Collection of Ungulates owes much to the generosity of private donors; but it may be hoped that Mr. Lydekker's appeal for additional specimens will meet with a due response. It is in particular important to realise that skins and skeletons are required for the study collection, and that in order to prove of real value specimens should be given without the condition that they must be placed in one of the public Galleries. It will be noticed from the Catalogue that an unduly large number of the specimens in the Museum are males, as would indeed have been expected. It is therefore desirable to improve the collection by adding to it the skins and skulls of female individuals, particularly in the case of those Ungulates in which the females are hornless, or have reduced horns.

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It need hardly be explained that Mr. Oldfield Thomas, F.R.S., has influenced the preparation of this Catalogue in many ways, and specially by the continued efforts he has made, for a number of years, to encourage the growth of the Collection under his charge, as well as by his numerous contributions to the literature of the subject.

SIDNEY F. HARMER,
Keeper of Zoology.

British Museum (Natural History),
London, S.W.
May 12, 1913.

INTRODUCTION

EXACTLY forty years have elapsed since the publication of the last Catalogue of the specimens of Ungulate, or Hoofed, Mammals in the collection of the Museum—namely, Dr. J. E. Gray's "Hand-List of the Edentate, Thick-skinned, and Ruminant Mammals"—in which were included not only the animals now classed as Ungulata (in the wider sense of that term), but likewise the members of the orders Edentata and Sirenia.

During this long period the collection of specimens of Ungulates has so enormously increased, and the systematic classification has been so much altered, that it has been deemed advisable to attempt a systematic and descriptive list of the entire series. For many reasons—notably the large bodily size of the majority of the species, the relatively small series of specimens by which many of the species and races are represented, and the fact that specimens very frequently comprise only the head or the skull and horns—this is by no means an easy task; and it should be clearly understood that, under present circumstances, it is impossible to make a Catalogue of these animals comparable, for instance, in the matter of systematic detail and in neatness and conciseness of definition, with Dr. Knud Andersen's "Catalogue of Chiroptera," now in course of publication. All that can be done is to record the leading characteristics of the various species, so far as they are at present known, and to leave the completion of the task for the future.

To render that possible it is essential that a much larger series of complete skins of even the commoner species than is now contained in the collection should be brought together; and the publication of the present Catalogue may

perhaps serve as an inducement to sportsmen, travellers, and others with like opportunities, to aid in this work while there is yet time. In view of the rapid diminution of Big Game Animals in almost all parts of the world, the Museum ought to possess not only a large series of skins of every species to be permanently preserved for purposes of study, but also a reserve series to replace the specimens exhibited in the public galleries as these become faded and generally deteriorated—and this not only once but several times over.

To render a Catalogue of this nature suitable in all respects to the requirements of both scientific naturalists and of sportsmen, is an absolute impossibility; but as the Ungulates form a group of special interest to the latter class, an attempt has been made to render the descriptions of the various groups and species as little abstruse as possible.

To a great extent the principle of classing nearly related kinds of animals as races of a single species, rather than as distinct species, has been followed; and, to accord with this, generic terms are frequently used in a wider sense than is customary with many other writers.

In order to bring the work more or less nearly into line with other recently issued Catalogues of Mammals, it has been decided to adhere in the main to the principle of priority in the matter of scientific nomenclature, and also to employ tautonomic designations (such as *Rupicapra rupicapra*) in cases where the original specific name has been raised to generic rank. Adherence to this principle has involved changes even in certain names employed in my recently issued "Catalogue of the Hume Bequest"—changes which are deplored by no one more than by myself, but for which the officers of the Zoological Department of the Museum are solely responsible.

A manuscript catalogue of the specimens of Ungulates in the collection, made by Mr. Oldfield Thomas, F.R.S., and

extending down to about the year 1894, has afforded a large amount of assistance in the work. In the matter of illustrations, acknowledgments are due to the Zoological Society, to Rowland Ward, Ltd., and to personal friends and colleagues of my own whose names are mentioned in the sequel.

Unless the contrary is stated, each specimen entered in this Catalogue is assumed to represent an adult male. Most of the older stuffed specimens are entered as mounted skins, despite the fact that a considerable number of these have already been converted into flat skins, and that the process of conversion is likely to be continued in the future.

R. LYDEKKER.

March 20th, 1913.

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CATALOGUE

OF

UNGULATES.

ORDER UNGULATA.

THE ungulate or hoofed mammals, which include the largest of all land quadrupeds, are herbivorous or omnivorous, and have their limbs adapted solely for progression, so that there is no power of pronating and supinating the fore-foot, with the consequent complete absence of prehensile action. Except in the hyraxes and the camel tribe, the toes are encased in hoofs or protected in front by large hoof-like nails, the toes themselves being usually free, although occasionally connected by membrane. In number the toes range from five to one. Clavicles, or collar-bones, are invariably wanting in the existing members of the order (which alone are considered in the present work). The cheek-teeth, which are preceded by a deciduous series of the same type, have relatively broad and flattened crowns, surmounted by tubercles or ridges, and frequently deeply interpenetrated by foldings.

In the less specialised members of the order the cheek-teeth have low crowns with shallow infoldings (brachyodont), whereas in the more specialised types their crowns are more or less elevated, with a concomitant increase in the depth and complexity of the infoldings, which are often more or less completely filled with cement (hypsodont).

The order has a cosmopolitan distribution, exclusive of Australia and New Zealand.

Its existing representatives are divisible into four sub-ordinal groups, of which the names and leading distinctive features are as follows:—

A. The bones of the upper and lower transverse rows of the wrist-joint, or carpus, alternating with one another, so as to permit the os magnum to articulate with the scaphoid (instead of the lunar or cuneiform); toes never more than 4 in number.

a. The two middle toes (which may be the only ones), or those representing the 3rd and 4th of the 5-toed foot, equal in size and symmetrical to a vertical line drawn between them. Distribution co-extensive with that of the whole order ..... ARTIODACTYLA.

b. The third toe (which may be the only one) larger than the lateral ones (when present), and symmetrical in itself. Restricted at the present day in a wild state to the Old World ..... PERISSODACTYLA.

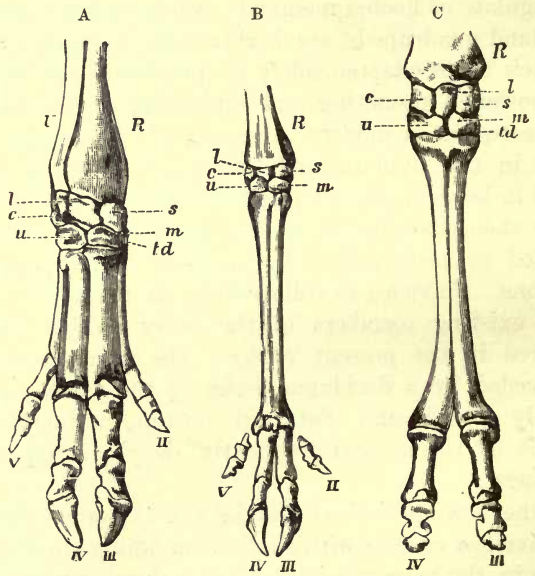


FIG. 1.—BONES OF THE RIGHT FORE-FEET OF THE PIG (A), THE DEER (B), AND THE CAMEL (C).

R, radius; *U*, ulna, below which come the two rows of small bones constituting the carpus, or wrist; *c*, cuneiform; *l*, lunar; *s*, scaphoid; *u*, unciform; *m*, magnum; *td*, trapezoid.

The Roman numerals indicate the toes.

From Flower's *Osteology of the Mammalia*.

B. The bones of the two horizontal rows of the wrist arranged vertically one above the other, the os magnum consequently articulating with the lunar or cuneiform, but not with the scaphoid.

a. Bodily size small; muzzle normal; functional toes 4 in front and 3 behind; cheek-teeth rhinoceros-like; front teeth well developed. Restricted to Africa, Syria, and Arabia ..... HYRACOIDEA.

b. Bodily size large; upper lip and nose produced into a long flexible trunk; cheek-teeth consisting of a number of tall transverse vertical plates, of which there are fewest in the first and most in the last tooth of the series; front teeth reduced to a pair of large rootless upper incisors (tusks). Restricted to South-eastern Asia and Africa at the present day, but formerly as widely spread as the order ..... PROBOSCIDEA.

The first two suborders are frequently brigaded together as Ungulata Vera, or Diplarthra, and the last two as Subungulata.

Some writers, on the other hand, exclude the Hyracoidea and Proboscidea from the Ungulata, which will then, so far at least as existing forms are concerned, consist of two main groups, the Artiodactyla, in which the main axis of the foot lies between the third and fourth digits, producing the well-known cloven hoof, and the Perissodactyla, in which the main axis of the foot passes through the middle of the third toe.

SUBORDER I.—ARTIODACTYLA.

The "even-toed" ungulates include by far the greater number of the living representatives of the whole order, comprising as they do all the ruminants together with the hippopotamuses and swine.

The toes, of which there may be either four or two on each foot, are even in number, with those corresponding to the third and fourth of the typical series of five subequal, larger than the lateral pair (when these are present), and symmetrical to a vertical line between them. The number of the combined dorsal and lumbar vertebræ is usually nineteen.

There is no alisphenoid canal traversing the bones of the base of the skull; and on the upper surface of the latter there is no marked expansion of the upper extremities of the nasal bones. As a rule, the premolar teeth are simpler in structure than the molars, generally consisting, in the case of those of the upper jaw, of a single lobe, instead of two lobes; with very few exceptions, the last lower molar, and likewise the corresponding tooth of the milk-series, consists of three lobes, whereas the others have but two lobes. The femur lacks a third trochanter. The stomach is nearly always more or less complex; and the cæcum relatively small. The placenta is diffused or cotyledonary; and the teats are inguinal or abdominal.

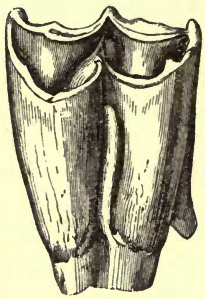


FIG. 2.—INNER ASPECT OF A SLIGHTLY WORN LEFT UPPER MOLAR TOOTH OF THE NILGAI (*Boselaphus tragocamelus*), to illustrate the tall-crowned selenodont type. The accessory column is the slender cylindrical one between the two crescentic inner main columns.

Nat. size.

The existing representatives of the suborder are divisible into the following sections and families:—

A. Upper incisors wanting. Ruminating.

a. Horns or antlers generally present, at least in males; metacarpal and metatarsal bones of main pair of toes fused, respectively, into a single cannon-bone, terminating inferiorly in a pair of pulley-like condyles; metacarpals and metatarsals of lateral toes incomplete or wanting (fig. 1 B); stomach 4-chambered..... PECORA.

a'. Cranial appendages in the form of non-deciduous unbranched horny sheaths, supported on bony cores. Crown of lower canine simple (fig. 4 A). World-wide, except South America..... BOVIDÆ.

b'. Cranial appendages similar to those of *Bovidæ*, but forked and deciduous. Crown of lower canine simple. North American ..... ANTILOCAPRIDÆ.

c'. Cranial appendages in the form of simple skin-covered conical prominences, which may be capped with bare bone. Crown of lower canine cleft and lobate (fig. 4 B). African..... GIRAFFIDÆ.

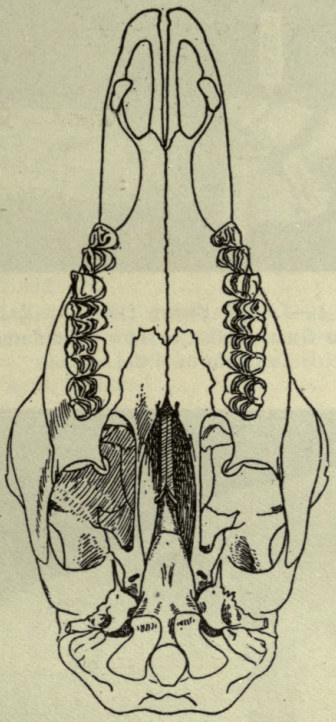


FIG. 3.—UNDER SURFACE OF SKULL OF RED DEER (*Cervus elaphus*), to show Ruminant upper dentition.
$\frac{1}{4}$ Nat. size. From Miller's *Cat. Mamm. West. Europe.*

d'. Cranial appendages in the form of branched bony deciduous antlers supported on permanent skin-covered pedicles. Crown of lower canine simple. Europe, North Africa, Asia, and North and South America..... CERVIDÆ.

b. No horns or antlers; main metacarpals and metatarsals either fused or separate; those of lateral toes complete; stomach 3-chambered ..... TRAGULINA.
South-east Asia and Africa ..... TRAGULIDÆ.

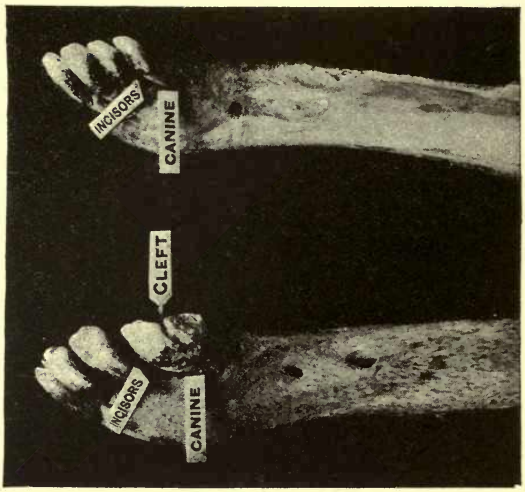


FIG. 4.—LOWER FRONT TEETH OF ELK (A) AND GIRAFFE (B), to show the difference in the form of the canine.

FIG. 5.—SKULL OF THE SOUTH AMERICAN PUDU DEER to show the preorbital fossa, or depression (*pf.*), which contains a gland.

⅔ nat. size.

B. Upper incisors present.

a. Dentition selenodont; cannon-bones with diverging smooth inferior surfaces (fig. 1 C); feet cushion-like, with large nails. Ruminating ..... TYLOPODA.

Lateral toes wanting. Asia, Africa, and South America ..... CAMELIDÆ.

b. Dentition bunodont; metacarpal and metatarsal bones of main toes separate. Non-ruminating ..... SUINA.

a'. Muzzle elongated into a snout terminating in a soft fleshy disc perforated by the nostrils; feet narrow, encased in complete hoofs; lateral toes not reaching ground (fig. 1 A).

a''. Toes 4–3; tips of upper canines directed downwards; a dorsal gland. America ..... DICOTYLIDÆ.

b''. Toes 4–4; tips of upper canines curving upwards; no dorsal gland. Old World ..... SUIDÆ.

b'. Snout broad, bristly, not forming a disc; feet short and broad, with large hoof-like nails; lateral toes touching ground. Africa ..... HIPPOPOTAMIDÆ.

The following special terms are often used in connection with even-toed ungulates:—

Muffle, or *rhinarium*, the bare moist area around and between the nostrils.

Preorbital gland, or larmier, a gland, opening on the face by a circular or longitudinal orifice, in front of the eye; usually contained in a pit in the skull known as the *lachrymal fossa* (fig. 5). Generally referred to as face-gland in the sequel.

Lachrymal fissure, an unossified space in the skull near the lachrymal fossa.

Supraorbital pits, a pair of pits in the frontal bones of the skull.

Inguinal glands, glands in the groin.

Pedal or *foot-glands*, glands situated above or between the two main hoofs, and discharging by means of a small orifice situated on the front surface of the foot.

Section A.—PECORA.

The Pecora, or typical ruminants, are distinguished, among other features, by the absence of upper front or

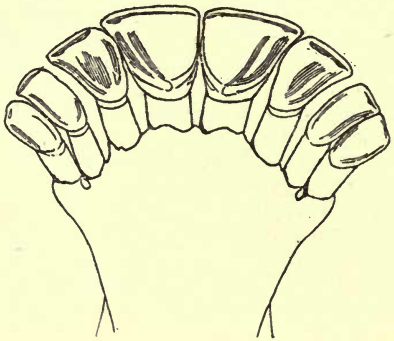


Fig. 6.—Lower Front Teeth of Red Deer (*Cervus elaphus*), to show arrangement characteristic of Pecora. The outermost pair are canines, and the other three pairs incisors.

Nat. size. From Miller's *Cat. Mamm. West. Europe.*

incisor teeth (fig. 3), and by the lower incisors forming, in conjunction with the lower canines, a semicircle of four spatulate pairs (fig. 6), which bite against a callous pad in

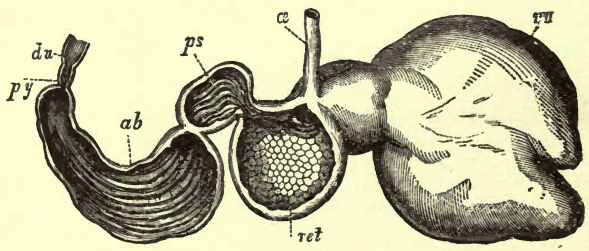


Fig. 7.—The Stomach of a Sheep, cut open to show the Internal Structure.

œ, œsophagus, or gullet; *ru*, rumen, or paunch; *ret*, reticulum, or honeycomb; *ps*, psalterium, or manyplies; *ab*, abomasum; *py*, pylorus; *du*, duodenum, the commencement of the small intestine.

the upper jaw. In most cases the dental formula is $i.\frac{0}{3}$, $c.\frac{0-1}{1}$, $p.\frac{3}{3}$, $m.\frac{3}{3} = 32$ or 34. The cheek-teeth (premolars and molars) are selenodont (fig. 2), that is to say, carry crescent-shaped columns on their grinding surfaces, so arranged that

the direction of the crescents in the lower jaw is the reverse of that in the upper. The metacarpals of the main pair of toes in the fore-foot and the corresponding metatarsals in the hind-foot respectively unite into a cannon-bone; while the metacarpals and metatarsals of the small lateral toes (which may be absent) are never complete, but represented either by their upper or lower ends (fig. 1 B). The pair of condyles in which each cannon-bone terminates inferiorly are parallel to one another and severally carry a pulley-like ridge. The navicular and cuboid bones of the tarsus are united. With a few exceptions, either horns or antlers are developed, at least in the males. The stomach has four complete cavities (fig. 7); and the placenta is of the cotyledonous type.

Family I.—BOVIDÆ.

The cranial appendages take the form of hollow, permanent (*i.e.* non-deciduous) sheaths of horn supported on bony cores, containing numerous air-cells, which arise from the frontal bones of the skull; such appendages being common in the majority of the genera to the two sexes, but in others restricted to the male. Upper canines wanting; lower canines with simple crowns (fig. 4 A); cheek-teeth frequently hypsodont. Lateral toes always incomplete, being sometimes entirely absent, but more generally represented either by the hoofs alone, or by these and vestiges of the skeleton, the phalanges being replaced by irregular bony nodules; lower ends of lateral metacarpals invariably absent. Gall-bladder nearly always present. Placenta with numerous cotyledons.

The horns of the *Bovidæ* vary in the direction of their twist; the right horn in some cases forming a right-handed spiral, and the left horn a left-handed spiral, whereas in other instances the reverse condition obtains.

Taking a screw, or corkscrew, as a right-handed spiral, the same spiral obtains in the right horn of the extinct antelopes of the genus *Oïoceros;* the left horn forming a left-handed spiral. The same condition obtains in the horns of cattle, and the more typical sheep, both wild and tame, in

which the direction of the horns is forward. In the red sheep (*Ovis orientalis*), although the right horn still forms a right-handed spiral, and the left horn a left-handed spiral, the curves are differently directed, the tip of each horn forming the summit of a downward instead of an upward spiral. This variation, which also occurs in the bharal (*Pseudoïs nahoor*) and the arui (*Ammotragus lervia*) among sheep, and in the East Caucasian tur (*Capra caucasica*) among goats, constitutes a "mathematical perversion," and causes the horns to curve backwards behind the neck.

The condition where the right horn forms a right-handed spiral is termed homonymous. In contrast to this is the heteronymous condition, in which the right horn forms a left-handed spiral and *vice versâ*. This condition obtains in existing antelopes. Most wild goats exhibit the same spiral in their horns, and this condition also obtains in the Circassian breed, but in other domesticated goats the spiral runs in the reverse direction, that is to say the right horn forms a right-handed spiral, as in sheep. Spirals of the kudu and markhor type have been described as "twists," and those of ordinary sheep (in which the horns are coiled, instead of twisted on their own axis) as "curves;" but the horns of domesticated breeds of sheep show a transition from one condition to the other.

A. Horns homonymous.
a. No face-glands or foot-glands; upper molars hypsodont, with broad crowns and an accessory column on inner side (fig. 2). Teats 4. Horns in both sexes, not much smaller in females than in males, smooth or wrinkled transversely, and set far apart at or near vertex of skull. Muzzle bare, moist, and undivided. Size generally large. Tail long and tufted ..... *Bovinæ*, p. 11.

B. Horns homonymous or heteronymous.
Face-glands and foot-glands present or absent; upper molars hypsodont, with narrow crowns and no distinct inner accessory column. Teats usually 2. Horns large, generally much larger in males than in females (in which they may be wanting), nearly smooth, wrinkled, or knobbed in front, set close together. Muzzle narrow, hairy, and vertically grooved. Tail usually short; never tufted ..... *Caprinæ*, p. 72.

c. Horns (when twisted) heteronymous.
  a. Horns in both sexes; relatively large in female. Tail generally short or rudimentary. Foot-glands and face-glands variable. Cheek-teeth caprine. Muzzle narrow, with large or small muffle. Teats frequently 4.
    a'. Horns cylindrical (at least at tips), simply conical, sharply re-curved at tip, or bent downwards and outwards at base, and finally directed upwards ..... *Rupicaprinæ*, p. 178.
  b''. Horns depressed, fibrous, approximated on forehead. Tail rudimentary ..... *Ovibovinæ*, p. 221.

N.B.—The continuation of this "key" is reserved for the second volume.

Subfamily i.—BOVINÆ.

Size usually large, body massive, limbs stout, and head carried low. Tail long, generally with terminal tuft. Muzzle large, broad, bare, moist, and undivided. No glands on face, in the feet, or in groin. Teats 4.

Horns homonymous (*i.e.* the right horn forming a right-handed spiral), present in both sexes, those of female relatively large; smooth or nearly so; inserted far apart on or near the vertex of the skull, directed at first more or less outwards, then curving upwards. Upper molars very hypsodont, with broad prismatic crowns and an accessory column between the two main columns on the inner side. Vertebræ*: C. 7, D. 13–14, L. 5–7, S. 4–5, Ca. 15–18.

In some extinct forms (subgenus *Leptobos*) the females are hornless.

Genus BOS.

Bos, *Linn. Syst. Nat.* ed. 10, vol. 1, p. 71, 1758, ed. 12, vol. 1, p. 98, 1766.
Taurus, *H. Smith, Griffith's Animal Kingdom*, vol. v, p. 375, 1827.
Urus, *H. Smith, op. cit.* vol. iv, p. 417, 1827.

Characters those of the subfamily.

In regard to the limitations of the genus Dr. W. T. Blanford† wrote as follows:—

"By many modern writers the animals here referred to

* C. = cervical; D. = dorsal; L. = lumbar; S. = sacral; Ca. = caudal.
† *Fauna of Brit. India, Mamm.* p. 483.

the genus *Bos* have been distributed amongst several genera. The distinctions between the latter are, however, scarcely of generic rank."

The genus, in this wider sense, is divisible into the following subgeneric groups:—

A. Horns circular or oval in section.
  a. Dorsal vertebræ 13; no long hair on fore-quarters or flanks.
    a'. No dorsal ridge or hump ..... *Bos.*
    a''. A dorsal ridge ..... *Bibos.*
  b. Dorsal vertebræ 14; long hair on flanks or fore-quarters.
    b'. A fringe of long hair on flanks ..... *Poëphagus.*
    b''. Long hair on fore-quarters..... *Bison.*
B. Horns triangular, or partially so, in section ..... *Bubalus.*

1. Subgenus **BOS.**

Horns circular or nearly so in section, situated far apart from one another on a ridge forming extreme vertex of skull, and overhanging the proper occipital surface of the latter, which is thereby concealed in a front view. Forehead flat and elongated, with a long interval between base of horn-core and orbit; the latter not tubular; nasals relatively long. Tail reaching below hocks. Line of back nearly straight. Hair uniformly short; legs (in wild species) coloured like body.

Thirteen pairs of ribs; neural spine of seventh cervical short; spines of dorsals moderately tall, and sloping gradually and regularly away to the lumbars, thereby producing the straight line of the back.

Europe and Asia.

I. BOS TAURUS.

Bos taurus, *Linn. Syst. Nat.* ed. 10, vol. i, p. 71, 1758, ed. 12, vol. i, p. 98, 1766.

Bos urus, *Linn. Syst. Nat.* ed. 10, p. 7, 1757, ed. 12, vol. i, p. 98, 1766.

Represented at the present day only by some of the domesticated breeds of cattle in Western Europe, the wild aurochs, which lingered longest in Poland, where it became extinct in 1627.

2. Subgenus **BIBOS.**

Bibos, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. vi, p. 499, 1837.
Gavæus, *Hodgson, op. cit.* vol. xvi, p. 706, 1847.
Gauribos, *Heude, Mém. Hist. Nat. Emp. Chin.* vol. v, pt. 1, p. 3, 1891.
Uribos, *Heude, op. cit.* p. 5.
Bubalibos, *Heude, loc. cit.*

Forehead shorter than in typical *Bos*, the interval between base of horn-core and orbit less; horns generally more or less elliptical in section, especially near the base, tail relatively shorter, reaching little if at all below hocks; a more or less distinct ridge extending from nape and withers to middle of back, where it terminates suddenly. Bulls generally darker in colour than cows and calves; legs below knees and hocks white or whitish. Hair short, fine and glossy, with no elongation on neck or elsewhere. Hoofs narrow and pointed.

Thirteen pairs of ribs; neural spines of dorsal vertebræ very tall, their summits forming a nearly straight line from the third to the eleventh, and then making a sudden drop to the thirteenth.

The subgenus contains the following two species:—

a. No white on back of thighs or horny mass between horns ..... *B. gaurus.*
b. Typically a large white disc on back of thighs; a horny mass connecting bases of horns ..... *B. banteng.*

II. BOS (BIBOS) GAURUS.

Bos gaurus, *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 399, 1827; *Evans, J. Asiat. Soc. Bengal*, vol. vi, p. 223, pl. xvi, 1837; *Elliot, ibid.* vol. x, p. 572, 1841; *Blyth, ibid.* vol. xi, p. 444, 1842, vol. xxi, p. 433, 1852, vol. xxxi, p. 336, 1862; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 227, 1884; *Blanford, Proc. Zool. Soc.* 1890, p. 592, *Fauna Brit. India, Mamm.* p. 484, 1891; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 124, 1891; *Huet, Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 12, 1891; *Ward, Records of Big Game*, p. 270, 1896; *Pollok, Zoologist*, ser. 4, vol. ii, p. 2, 1898; *Lydekker, Great and Small Game of India, etc.* p. 40, 1901, *The Ox and Its Kindred*, p. 201, 1912; *Pocock, Proc. Zool. Soc.* 1910, p. 933.

Bos (Bison) gaurus, *H. Smith, Griffith's Animal Kingdom*, vol. v, p. 373, 1827.

Bos gour, *Hardwicke, Zool. Journ.* vol. iii, p. 233, 1828; *Cantor, J. Asiat. Soc. Bengal*, vol. xv, p. 272, 1846.

Bos gavæus, *Hardwicke, Zool. Journ.* vol. iii, p. 233, 1828.

Bison gaurus, *Jardine, Nat. Library, Mamm.* vol. iv, p. 251, 1836.

Bibos subhemachelus, *Hodgson, J. Asiat. Soc. Bengal*, vol. vi, p. 499, 1837.

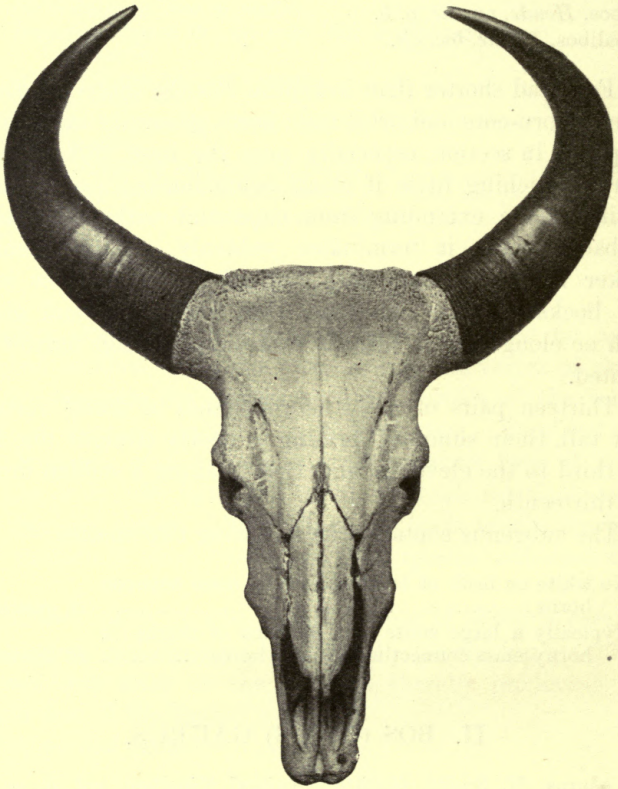


FIG. 8.—SKULL AND HORNS OF COW GAUR (*Bos gaurus*).
From Ward's *Records of Big Game.*

Bibos cavifrons, *Hodgson, J. Asiat. Soc. Bengal*, vol. vi, p. 745, 1837, vol. x, p. 449, 1841, vol. xvi, p. 706, 1847; *Elliot, Madras Journ.* vol. x, p. 227, pls. v, vi, 1839; *Horsfield, Cat. E. Ind. Mus.* p. 181, 1851.

Bos gaur, *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 152, 1846.

Bibos gaurus, *Gray, Cat. Hodgson Coll.* p. 24, 1846, *Cat. Ungulata Brit. Mus.* p. 32, 1852, *Cat. Ruminants Brit. Mus.* p. 13, 1872, *Hand-List Ruminants Brit. Mus.* p. 83, 1373; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 228, 1862; *Rütimeyer, Denks.*

schweiz. Ges. vol. xxii, p. 170, 1867, *Abh. schweiz. pal. Ges.* vol. v, p. 189, 1878; *Davison, Proc. Zool. Soc.* 1889, p. 447; *Baker, J. Bombay Nat. Hist. Soc.* vol. xv, p. 227, 1903.

Bibos asseel, *Horsfield, Cat. E. Ind. Mus.* p. 181, 1851.

Gavæus gaurus, *Blyth, J. Asiat. Soc. Bengal*, vol. xxix, p. 282, 1860; *Jerdon. Mamm. Ind.* p. 301, 1867; *Sterndale, Mamm. Ind.* p. 481, 1884; *Forsyth, Highlands of Central India*, 2nd ed. p. 112, 1889; *Sanderson, Thirteen Years Among Wild Beasts of India*, p. 243, 1890.

Bos (Bibos) gaurus, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 23, pl. i, 1898, *Game Animals of India, etc.* p. 50, 1907; *Ward, Records of Big Game*, ed. 5, p. 440, 1907, ed. 6, p. 440, 1910.

Gaur.

The following names have been given to the gayal, the domesticated, or semi-domesticated, representative of the gaur, and although the first of these antedates *gaurus*, it is not considered desirable that it should be adopted as the name of the species:—

Bos frontalis, *Lambert, Trans. Linn. Soc.* vol. vii, pp. 57, 302, 1804; *Sundevall, K. Svenska Vet. Ak.-Handl.* 1844, p. 76, 1846; *Blyth, Journ. Asiat. Soc. Bengal*, vol. xxxi, p. 338, 1862; *Sclater, Proc. Zool. Soc.* 1866, p. 1, pl. i; *Sarbo, ibid.* 1883, p. 143; *Blanford, ibid.* 1890, p. 593, *Fauna Brit. India, Mamm.* p. 487, 1891; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 126, 1891; *Huet, Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 9, 1891; *Baker, J. Bombay Nat. Hist. Soc.* vol. xv, p. 227, 1903.

Bos sylhetanus, *F. Cuvier, Hist. Nat. Mamm.* pl. 418, 1824.

Bison sylhetanus, *Jardine, Nat. Library, Mamm.* vol. iv, p. 257, 1836.

Bibos frontalis, *Gray, List. Mamm. Brit. Mus.* p. 151, 1843, *Cat. Ungulata Brit. Mus.* p. 31, 1852, *Cat. Ruminants Brit. Mus.* p. 13, 1872.

Gavæus frontalis, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xvi, p. 706, 1847; *Horsfield, Cat. East Ind. Mus.* p. 175, 1859; *Blyth, Journ. Asiat. Soc. Bengal*, vol. xxix, p. 294, 1860; *Sterndale, Mamm. Ind.* p. 486, 1884.

Bos (Bibos) frontalis, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 31, 1898, *Game Animals of India, etc.* p. 64, 1907.

Bos gaurus frontalis, *Lydekker, The Ox and Its Kindred*, p. 177, 1912.

Typical locality (wild race) probably some part of India.

Size large (height in bulls from 6 feet to 6 feet 4 inches or 6 inches at withers), build massive, with the body deep and limbs relatively short. Ears large. Dorsal ridge strongly developed, ending in sudden step about midway between withers and tail. Skull typically with a high, arched, forwardly curving intercornual ridge at vertex, which is, however, often obsolete in Malay race; horns flattened at base, strongly curved, with inwardly inclined tips, pale

greenish in colour with black tips, these characters less marked in Malay race. Tail reaching hocks. Typically little or no dewlap. Hair short, sparse on back of old bulls;

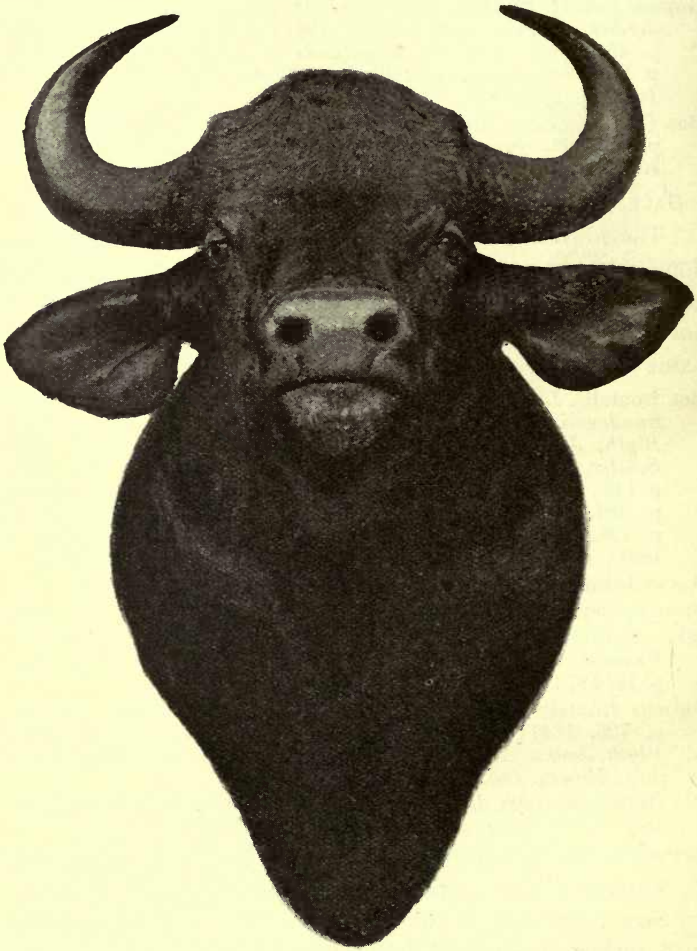


Fig. 9.—Head and Neck of Indian Gaur (*Bos gaurus*).

typically dark olive-brown, tending to blackish above, underparts paler, but golden brown at insertion of limbs; upper part of forehead to nape ashy grey, sometimes passing into whitey brown or dirty white; legs white or whitish from below knees and hocks downwards; muzzle pale-coloured;

eyes typically blue. In cows and immature bulls colour less dark, and occasionally tending to rufous; apparently a dark dorsal streak in calves.

The range includes the larger hill-forests of the Indian

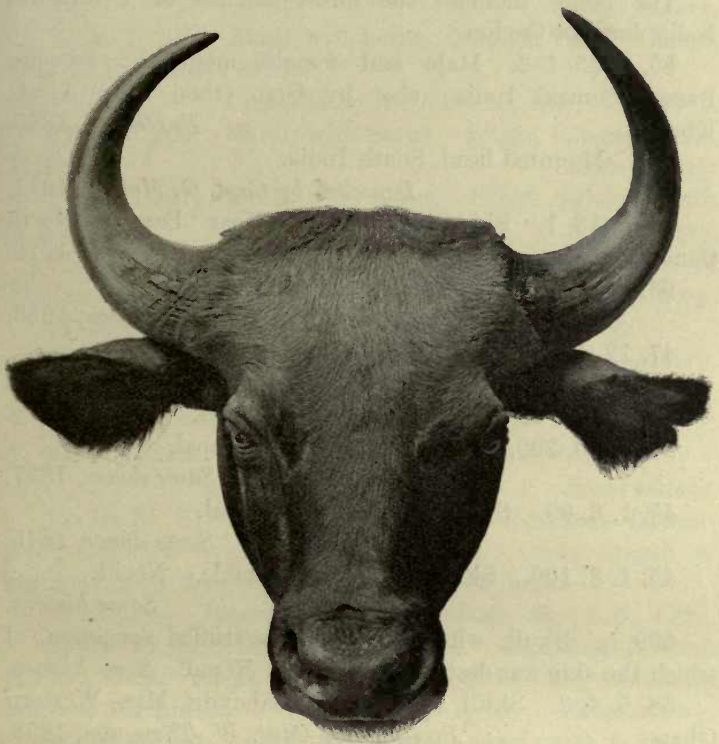


FIG. 10.—HEAD OF MALAY GAUR OR SELADANG (*Bos gaurus hubbacki*).
From *Game Animals of India, etc.*

Peninsula, Burma, and the Malay Peninsula, but eastern limits not definitely known.

Three local races have been described, which may be distinguished as follows:—

A. Intercornual ridge rising on a prominent, forwardly inclined arch.
  a. Generally no dewlap; no throat-fringe; colour olive-black ..... *B. g. gaurus.*
  b. A distinct dewlap and throat-fringe; colour darker ..... *B. g. readi.*
B. Intercornual ridge forming a less prominent and less forwardly inclined arch, which may be practically absent ..... *B. g. hubbacki.*

A.—Bos gaurus gaurus.

Characters those given above as typical of the species.

The range includes the forest-districts of Peninsular India, but not Ceylon.

85. 2. 25. 1–2. Male and female, mounted. Satpura Range, Central India; shot by Gen. (then Col.) A. A. Kinloch. *Purchased*, 1885.

* *. Mounted head, South India.
Deposited by Capt. G. Meekin, 1911.

12. 5. 13. 1. Skin, imperfect. Near Barcha, North Canara. *Presented by Bombay Nat. Hist. Soc.*, 1912.

63. 10. 23. 1. Skeleton, mounted. India.
Presented by Capt. W. C. Robinson, 1863.

47. 12. 15. 1. Skeleton. Nepal (?).
Presented by B. H. Hodgson, Esq., 1847.

47. 12. 15. 2. Skeleton, female. Nepal. *Same history.*

37. 6. 10. 290. Skull, with horns. Nepal.
Same donor, 1837.

45. 1. 8. 99. Skull, with horns. Nepal.
Same donor, 1845.

45. 1. 8. 100. Skull, with horns, female. Nepal.
Same history.

609, *a*. Skull, with horns, from a stuffed specimen, of which the skin was destroyed in 1888. Nepal. *Same history.*

58. 5. 4. 2. Skull, with horns. Sahaydri Mts., Western Ghats. *Presented by Capt. W. Thompson*, 1858.

58. 5. 4. 3. Skull, with horns. Same locality.
Same history.

58. 5. 4. 4. Skull, with horns. Same locality.
Same history.

609, *s*. Skull, with horns. India.
Presented by Dr. Hugh Falconer, about 1840.

609, *t*. Skull, with horns. India.
Bequeathed by Gen. T. Hardwicke, about 1835.

89. 11. 20. 9. Frontlet and horns. Rajputana.
Presented by Col. J. Evans, 1889.

79. 11. 21. 12. Skull, with horns. Madras; collected by Dr. Christie. *Transferred from India Museum*, 1879.

79. 11. 21. 13. Skull, with horns. India. *Same history.*

90. 11. 25. 1. Skull, with horns. Mysore.
Presented by P. Bosworth Smith, Esq., 1890.

90. 11. 25. 2. Skull, with horns. Mysore.
Same history.

91. 8. 7. 205. Skull, with horns. Nonurli Valley, Chand, Central Provinces (1876).
Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 206. Skull, with horns. Biliga, Rangam Hills, Mysore. *Same history.*

91. 8. 7. 207. Skull, with horns. Salem district, south of Nilgiris. *Same history.*

91. 8. 7. 208. Skull, with horns. Western Duars of Bhutan. *Same history.*

91. 8. 7. 209. Skull, with horns. Same locality.
Same history.

91. 8. 7. 211. Skull, with horns. Central Provinces.
Same history.

91. 8. 7. 212. Skull, with horns. Chittagong.
Same history.

12. 10. 31. 81. Skull, with horns. Northern Travancore; collected by A. W. Turner, Esq. Outer length of horns 31, girth 16¼, tip-to-tip interval 21 inches.
Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 82. Skull, with horns. Southern Mishmi Hills. Outer length of horns 21, girth 15¾, tip-to-tip interval 36½ inches. *Same history.*

12. 10. 31. 80. Skull, with horns, female (fig. 8, p. 14). Northern Travancore; collected by Mr. Turner. Length of horns 24, girth 13¼, tip-to-tip interval 13 inches. This specimen stands No. 65 in Ward's list. *Same history.*

609*. Skull and horns. *No history.*

*. Skull and horns. *No history.*

†. Detached pair of horns, polished. *No history.*

‡. Another pair of polished horns. *No history.*

B.—Bos gaurus readi.

Bos gaurus readi, *Lydekker, Zoologist*, ser. 4, vol. vii, p. 266, 1903, *Game Animals of India, etc.* p. 62, 1907, *The Ox and Its Kindred*, p. 201, 1912.

Typical locality Burma.

Characterised by the tall stature, dark, nearly black, body-colouring, thickly haired, fringed ears, the presence of a dewlap furnished with a fringe or tuft of hair in adult bulls, the downward extension of the tawny grey area on the forehead, and in some cases by a tawny band round the lower part of the jaw just above the muzzle.

This race inhabits the hill-forests of Burma and Tenasserim.

79. 11. 21. 6. Mounted head. Burma.
Transferred from India Museum, 1879.

3. 12. 27. 1. Mounted head. Burma.
Presented by Mrs. Mumford, 1903.

67. 5. 7. 3. Skull, with horns. Tenasserim.
Presented by R. C. Beavan, Esq., 1867.

C.—Bos gaurus hubbacki.

Bos gaurus hubbacki, *Lydekker, Game Animals of India, etc.* p. 64, 1897, *The Ox and Its Kindred*, p. 201, 1912.

Typical locality Pahang, Malay Peninsula.

No dewlap, lower segments of legs dirty yellow, and the intercornual arch but slightly developed (fig. 9, p. 17), being altogether absent in the type specimen, which in this respect closely resembles a gayal. Compared with the typical Indian race, there is a greater extent of the tawny grey area on the forehead; and there is also a distinct whitish band above the muzzle.

The range of this race includes the Malay Peninsula, and may extend northwards to Tenasserim.

7. 11. 27. 1. Mounted head. Pahang, Malay Peninsula. Type. *Presented by T. R. Hubback, Esq.*, 1907.

91. 8. 7. 210. Skull, with horns. Perak, Malay Peninsula.
Presented by A. O. Hume, Esq., C.B., 1891.

79. 11. 21. 14. Skull, with horns. Malay Peninsula; collected by Dr. Cantor.

Transferred from India Museum, 1879.

91. 1. 11. 1. Skull. Pinang, Malay Peninsula.

Presented by J. Rowland Ward, Esq., 1891.

D.—The following specimens belong to the domesticated or semidomesticated, gayal, ranging from Assam and Chittagong to Tenasserim:—

96. 6. 20. 1. Mounted skin. Assam. *Purchased*, 1896.

96. 6. 20. 1, *a*. Skeleton (skull without horns) of same.

Same history.

96. 9. 5. 1. Head, female, mounted. Assam.

Presented by the Zoological Society, 1896.

66. 8. 7. 8. Immature skin, mounted. Assam (?).

Presented by the Zoological Society, 1866.

66. 8. 7. 8, *a*. Skeleton of same. *Same history.*

68. 3. 21. 10. Skeleton, mounted. Assam (?).

Presented by the Zoological Society, 1868.

45. 1. 8. 98. Skeleton; skull, with horns, exhibited separately. Nepal (?).

Presented by B. H. Hodgson, Esq., 1845.

45. 1. 8. 97. Skull, with horns. Nepal (?).

Same history.

12. 10. 31. 88. Skull, with horns. Tenasserim, between the town of that name and Lemyne; shot by W. Davison, Esq. Mr. Hume's collector. Length of horns 14½, girth 13½, tip-to-tip interval 28 inches. This specimen stands No. 3 in Ward's list. It is mentioned by Blanford as being the only wild gayal with which he was acquainted.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

III. BOS (BIBOS) BANTENG.

Bos banteng, *Raffles, History of Java*, vol. i, p. 111, 1817; *Wagner, Schreber's Säugthiere, Suppl.* vol. iv, p. 517, 1844.

Bos leucoprymnus, *Quoy and Gaimard, Voyage de l'Astrolabe—Zoology*, vol. i, p. 140, 1830; based on a hybrid.

Bos sondaicus, *Müller and Schlegel, Verk. Nederland Ges.* vol. i, p. 195, pls. xxxv–xxxix, 1840; *Blyth, Journ. Asiat. Soc. Bengal*, vol. xi, p. 445, 1842, vol. xxxi, p. 336, 1862; *Blanford, Proc.*

Zool. Soc. 1890, p. 593, *Fauna Brit. India, Mamm.* p. 489, 1891; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 127, 1891; *Huet, Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 13, 1891; *Hose, Mammals of Borneo*, p. 64, 1893; *Evans, Journ. Bombay Nat. Hist. Soc.* vol. x, p. 78, 1895; *Ward, Records of Big Game*, p. 278, 1896; *Lydekker, Proc. Zool. Soc.* 1898, p. 277, *The Ox and Its Kindred*, p. 202, 1912; *Pollok, Zoologist*, ser. 4, vol. ii, p. 1, 1898; *Pocock, Proc. Zool. Soc.* 1910, p. 934.

Bos banting, *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 152, 1846.

Bibos banting, *Gray, Knowsley Menagerie*, p. 48, 1850, *Cat. Ungulata Brit. Mus.* p. 35, 1852, *Cat. Ruminants Brit. Mus.* p. 13, 1872; *Horsfield, Cat. E. India Mus.* p. 183, 1851; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 229, 1862; *Jentink, Notes Leyden Mus.* vol. xx, p. 125, pl. ii, 1898.

Gavæus sondaicus, *Blyth, Journ. Asiat. Soc. Bengal*, vol. xxix, p. 296, 1860; *MacMaster, Notes on Jerdon*, p. 131, 1870; *Sterndale, Mamm. of India*, p. 488, 1884.

Bibos sondaicus, *Rütimeyer, Denkschr. schweiz. Ges.* vol. xxii, pt. 2, art. 3, p. 170, 1867, *Abh. schweiz. pal. Ges.* vol. v, p. 189, 1878; *Sclater, List. Anim. Zool. Gardens*, p. 134, 1883.

Bubalus seleniceros, *vide Heller, Abh. Mus. Dresden*, 1890, p. 30; based on a, probably tame, specimen from Timor.

Bos (Bibos) sondaicus, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 36, pl. iii, 1898, *Game Animals of India, etc.* p. 67, 1907; *Ward, Records of Big Game*, ed. 6, p. 447, 1910.

Bantin, or Banting.

Typical locality Java.

Size smaller and build lighter than in the gaur, with the dorsal ridge less developed, and not forming a distinct hump the dewlap usually small, and the limbs relatively longer. Head more elongated and antelope-like, with the relatively small and slender horns, flattened at the base in adults, from which they curve upwards and outwards, but somewhat backwards and inwards towards the tips; cylindrical throughout in young. Bases of horns in old bulls connected by a rugose shield occupying the straight intercornual ridge. Tail well tufted and reaching somewhat below the hocks. General colour of females and young males reddish or tawny brown, approaching chestnut, lighter on under-parts, which may be white or whitish, as are the limbs, inner sides of ears and lips; legs in adults white or whitish from above knees and hocks to hoofs; a large white patch on the hind-quarters, which in the typical race extends to but does not include root of tail; colour of upper-parts in adult bulls ranging from black, with the aforesaid white rump-patch, to

uniform dark tawny, chestnut, or chocolate. Outside of limbs uniformly chestnut in calves, which also show a dark dorsal stripe.

The range includes Java, Borneo, probably Sumatra, Bali, apparently a portion of the Malay Peninsula, Burma as far as the north of Pegu and Arakan, and thence through the hill-country of Chittagong to Manipur, Siam, and Cochin China.

In addition to certain insufficiently described forms referred to later, the following five races have been named, although it is not at present possible to give the full distinctive characters of all of them:—

A. White rump-patch extending on to upper surface of hind-quarters; general colour of old bulls blackish brown or black, the forehead and face being coloured like the back.
  a. Horns of bulls directed to a great extent outwards at first, and then curving inwards; the span thus being relatively great; forehead of skull rather convex, with the intercornual ridge elevated in the middle ..... *B. b. banteng.*
  b. Horns of bulls directed at first upwards and outwards, at an angle of about 45°, and then curving inwards to a moderate extent and slightly forwards; the span thus being relatively small, and the horns themselves often smaller than in the preceding race; forehead of skull almost flat with the intercornual ridge nearly straight..... *B. b. lowi.*

B. Rump-patch less developed, not extending on to upper surface of buttocks; general colour of adult bulls ranging from dark fawn, orange, chestnut, to chocolate; face generally or always differing in colour from back.
  Horns of the general type of those of the typical race.
  a. Coat uniformly coloured..... *B. b. birmanicus.*
  b. Coat, in the two known examples, finely flecked with white..... *B. b. porteri.*

C. Apparently no white rump-patch; colour of bulls dark ..... *B. b. butleri.*

A.—Bos banteng banteng.

General colour of adult bulls blackish brown or black, with the face similar in tint to the back, and the white

rump-patch very large, and contrasting strongly with the dark area. Horns (fig. 11) directed at first to a great extent outwards, and then curving inwards and somewhat forward; the span thus being relatively large; forehead of skull somewhat convex, with the intercornual ridge rising

Fig. 11.—Skull and Horns of Javan Bantin (*Bos banteng banteng*).

into a distinct prominence in the line. Females reddish chestnut in colour, with very small horns.

In the wild state restricted to Java, but kept in a domesticated condition in the small adjacent island of Bali.

46. 12. 15. 4. Skin, mounted; bad condition. Java.
By exchange with Leyden Museum, 1846.

46. 12. 15. 5. Skin, female. Java. *Same history.*

64. * *. Immature male skin, in rufous coat. Java.
Presented by the Zoological Society, 1864.

4. 5. 12. 1. Head, mounted. Java.
Presented by Baron L. T. H. Van Hecheren-tot-Walien, 1904.

46. 12. 15. 6. Skeleton; skull, with horns (fig. 11), exhibited separately.
By exchange with Leyden Museum, 1846.

46. 12. 15. 7. Skeleton, female, mounted, with horns, which are very short. *Same history.*

67. 4. 12. 613. Immature skull, with horns. Java.
Lidth de Jeude Collection, 1867.

B.—Bos banteng lowi.

Bos sondaicus lowi, *Lydekker*, *Proc. Zool. Soc.* 1912, p. 906.

Typical locality Rejang Valley, Borneo.

Colour, so far as known, more or less nearly identical with that of typical race; horns of bulls (fig. 12) directed more upwardly, rising at first at an angle of about 45° with an upwards and outwards direction, and then curving to a moderate extent inwards and slightly forwards; in consequence of this shape the span is relatively small, the horns themselves being frequently smaller than in the typical race. Forehead of skull almost flat, with the intercornual ridge nearly straight.

Probably represented by an allied or identical form in Sumatra.

87. 2. 10. 4. Skull, with horns (fig. 12). Rejang Valley, N. Borneo. Type. *Presented by H. B. Low, Esq.*, 1887.

87. 2. 10. 1–3. Three skulls, with horns. Rejang Valley. *Same history.*

87. 2. 10. 5–7. Three skulls, with horns. Rejang Valley. *Same history.*

86. 12. 20. 5–6. Two skulls, with horns. Sandakan, N. Borneo. *Presented by W. B. Pryer, Esq.*, 1886.

80. 5. 4. 1. Skull and horns. Rejang Valley.
Presented by H. B. Low, Esq., 1887.

80. 5. 4. 2. A pair of horns. Rejang Valley.
Same history.

80. 5. 4. 3. A pair of horns. Kanowit Valley, N. Borneo. *Same history.*

79. 3. 5. 14. A pair of horns. Sarawak, N. Borneo. *Purchased*, 1879.

86. 12. 2. 7. } Two pairs of horns. Rejang Valley.
87. 2. 10. 8. } *Presented by H. B. Low, Esq.*, 1886–7

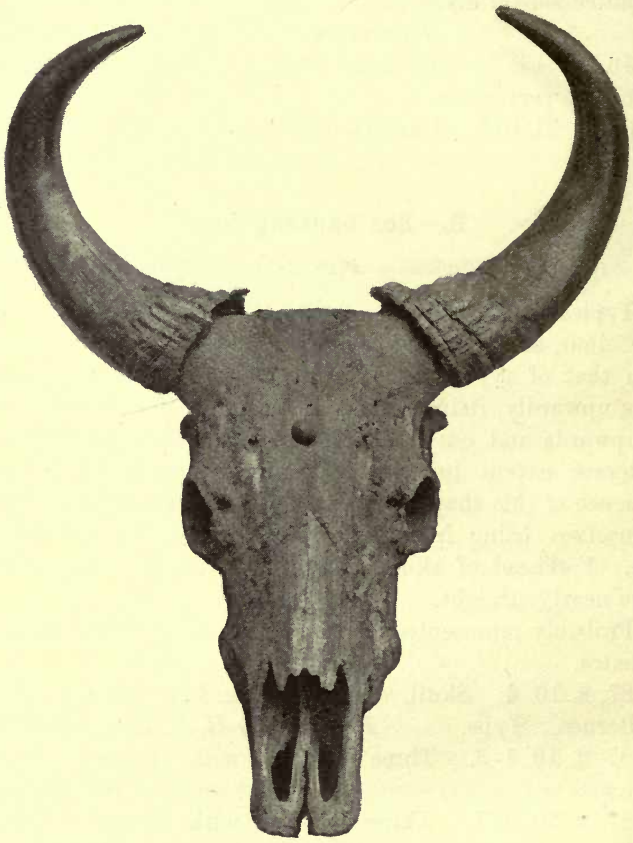


Fig. 12.—Skull and Horns of Bornean Bantin (*Bos banteng lowi*).

87. 2. 10. 9. Immature frontlet, with one horn. Rejang Valley. *Same history.*

0. 3. 30. 8. Fore part of skull and horns of female. Baram, Sarawak. *Presented by Dr. C. Hose*, 1900.

The dimensions, in inches, of the specimens represented in figs. 11 and 12 are as follows:—

	B. b. banteng.		*B. b. lowi.*
Length of horn on outer curve	25	...	21½
Basal girth of ditto	11¼	...	12½
Maximum span of horns	28	...	23½
Tip-to-tip interval of ditto	16	...	13
Length from intercornual ridge of skull to tip of nasals	16	...	13½
Minimum width of skull between base of horn-core and orbit	9	...	7½

C.—Bos banteng birmanicus.

Bos sondaicus birmanicus, *Lydekker*, *Proc. Zool. Soc.* 1898, p. 277, pl. xxv, *Wild Oxen, Sheep, and Goats*, p. 41, 1898, *Game Animals of India, etc.* p. 59, 1907.

Typical locality Burma.

General colour of adult bulls dark tawny or dark chestnut, appearing darker in some lights than others, and

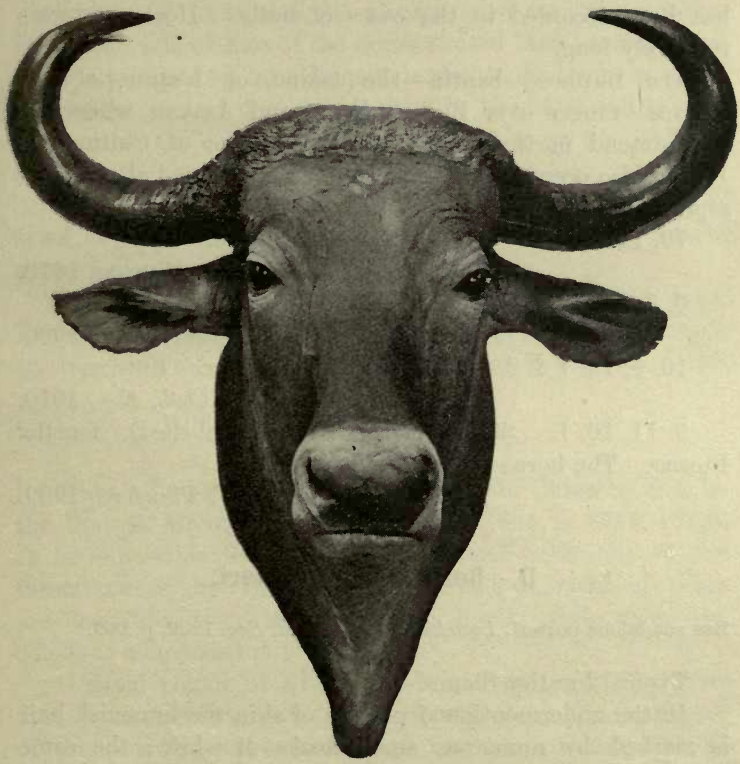


Fig. 13.—Head and Neck of Burmese Bantin, or Tsaine (*Bos banteng birmanicus*).

shading into light brown below. Face tawny grey, with a light chestnut patch or band between the muzzle and a line just below the eyes; a whitish band separating this from the black muzzle. Very old bulls may apparently become darker. Information is lacking with regard to the rump-patch, but it is smaller than in the typical race, and apparently confined to the hind surface of the buttocks and thighs; while in the bulls of the Manipur form, which may indicate a distinct race, it is stated to be absent. A dusky band on front of fore-leg above knee. Horns of the general type of those of the Javan race. Cows are bright reddish chestnut at all ages, with the face lighter than the back, especially on the forehead, round the eyes, and above the muzzle, where, like the under-parts and the lower segment of the legs, it is dirty white. A height of 5 feet 4½ inches has been recorded in the cases of bulls. Horns of cows relatively long.

The Burmese bantin—the tsaine, or h'saine, of the natives—ranges over Burma, Pegu, and Arakan, whence it may extend northwards to the hill-ranges of Chittagong. Bantin also occur in Manipur, and, as mentioned above, may represent a separate race.

79. 11. 21. 16. Mounted head. Burma. Type.
Presented by the India Museum, 1879.

0. 9. 11. 1. Mounted head (fig. 13). Burma.
Presented by R. McD. Hawker, Esq., 1900.

10. 5. 18. 1 & 2. Two skulls, with horns. Burma.
Presented by H. R. Cook, Esq., 1910.

9. 11. 16. 1. Skull, with horns (polished), female. Burma. The horns are relatively long.
Presented by Mrs. W. T. Blanford, 1909.

D.—Bos banteng porteri.

Bos sondaicus porteri, *Lydekker*, *Proc. Zool. Soc.* 1909, p. 669.

Typical locality Siam.

In the undermentioned portion of skin the brownish hair is marked by numerous small flecks of white; the same feature also characterising a second bull shot by the donor

of that specimen. Horns of the general type of those of *B. s. birmanicus*, but very heavily ridged at the base.

10. 4. 21. 2. Skull, with horns, and portion of skin. Siam. Type. *Presented by A. H. Porter, Esq.*, 1910.

82. 4. 25. 1. Skull, with horns. W. Siam; collected by Herr Carl Bock. *Purchased*, 1882.

E.—Bos banteng butleri.

Bos sondaicus butleri, *Lydekker*, *Field*, vol. cv, p. 151, 1905, *Game Animals of India, etc.* p. 76, 1907.

Bos sondaicus, *Butler*, *Journ. Bombay Nat. Hist. Soc.* vol. xiii, p. 192, 1900.

Typical locality Malay Peninsula.

The bantin found in the Malay Peninsula appears to be very rare and local, and the possibility of its being nothing more than a feral race of the domesticated Bali bantin, which is largely imported into Singapore, should be borne in mind. The colour is stated to be blackish in the bulls and reddish chestnut in the cows, with little or no white on the rump, at least in the latter; the lower portion of the legs varying in colour from dirty white to reddish or blackish. Horns of cows very short, as in typical race, to which this bantin appears closely related.

5. 1. 18. 1. Skull, with horns, of female. Perak; type. The animal was shot by Captain J. C. Lamphey. The horns are very small. *Presented by H. C. Robinson, Esq.*, 1905.

F.—Bos banteng, subsp.

Known by an adult bull shot in Cochin China by H.R.H. the Duc de Montpensier (see *Field*, vol. cxx, p. 1319, 1912). It is impossible to identify this animal with any of the forms named by Heude (*infra*, p. 30), as most of these are described from the skull and horns, while when the colour is mentioned it is different.

General colour of adult bull bright orange, with a paler dorsal streak; face fawn; a white ring above the bare part of the muzzle; a blackish band encircling fore-leg above knee, and a similar but less defined band on front surface of

hind-leg; white area on hind-quarters restricted to posterior aspect of buttocks and thighs.

No example in the collection.

The following names have been applied to representatives of this group from French Indo-China (Tonkin, Annam, etc.):—

Gauribos laosiensis, *Heude, Mém. Hist. Nat Emp. Chin.* vol. v, pt. 1, p. 3, 1901. Laos, Tonkin.

Gauribos brachyrhinus, *Heude, op. cit.* p. 4. Cambodia, characterised by shortness of nasals.

Gauribos sylvanus, *Heude, loc. cit.* Moïs, Tonkin. Described from skull and horns.

Gauribos mekongensis, *Heude, op. cit.* p. 5. Kratie, Mekon Valley.

Uribos platyceros, *Heude, loc. cit.* Range dividing Tourane Bay from the rivers of Hue.

Bubalibos annamiticus, *Heude, op. cit.* p. 6. Annam. Bulls black, with bright brown frontal patch.

Bos (?) leptoceros, *Heude, loc. cit.* Kampot, on the coast of the Gulf of Siam.

Bibos discolor, *Heude, op. cit.* p. 8. No locality. Old bulls blackish grey, with a whitish area suffused with red on forehead.

Bibos longicornis, *Heude, op. cit.* p. 9. No locality. Described, like next, from skull and horns.

Bibos (?) fusicornis, *Heude, loc. cit.* Tonkin.

3. Subgenus **POËPHAGUS.**

Poëphagus, *Gray, List. Mamm. Brit. Mus.* p. 153, 1843, *Cat. Ungulata Brit. Mus.* p. 39, 1852.

Horns more or less nearly circular in section, widely separated, on a ridge placed below the extreme vertex of the skull, so that the summit of the crest of the occiput is visible from the front. Forehead short, wide, and slightly convex, with a short interval between base of horn-core and orbit. Tail reaching about to hocks. Withers elevated. A fringe of long hair extending from chin and throat along the lower part of flanks and belly; tail long-haired throughout.

Fourteen pairs of ribs; neural spine of seventh cervical vertebra tall; spines of dorsals very tall, descending rapidly and suddenly to the lumbars.

Restricted to Tibet and the adjacent districts of China.

IV. BOS (POËPHAGUS) GRUNNIENS.

Bos grunniens, *Linn. Syst. Nat.* ed. 10, vol. i, p. 71, 1758, ed. 12, vol. i, p. 99, 1766; *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 153, 1846; *Radde, Reisen Öst-Sibirien*, p. 272, 1861; *Severtzow, Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 336, 1876; *Kinloch, Large Game Shooting*, vol. ii, p. 5, 1876; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 227, 1884; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 128, 1891; *Blanford, Fauna Brit. India, Mamm.* p. 490, 1891; *Ward, Records of Big Game*, p. 277, 1896; *Pousargues, Mém. Soc. Zool. France*, 1898, p. 138; *Köhler, Zool. Gart.* vol. xl, p. 72, 1899; *Grevé, ibid.* p. 313; *Pocock, Proc. Zool. Soc.* 1910, p. 934.

Bos poëphagus, *Pallas, Zoogr. Rosso-Asiat.* vol. i, p. 248, pl. xxii, 1811; *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 404, 1827; *Hutton and Blyth, Journ. Asiat. Soc. Bengal*, vol. xv, p. 143, 1846.

Bos (Bison) poëphagus, *H. Smith, Griffith's Animal Kingdom*, vol. v, p. 374, 1827.

Bison poëphagus, *Jardine, Nat. Libr. Mamm.* vol. iv, p. 259, 1836; *Hodgson, Journ. Asiat. Soc. Bengal*, vol. x, pp. 449 and 912, 1841, xvi, p. 708, 1847.

Poëphagus grunniens, *Gray, List Mamm. Brit. Mus.* p. 153, 1843, *Cat. Ungulata Brit. Mus.* p. 40, 1852, *Proc. Zool. Soc.* 1853, p. 191, pl. xxxv, *Cat. Ruminants Brit. Mus.* p. 14, 1872; *Horsfield, Cat. E. Ind. Mus.* p. 184, 1851; *Adams, Proc. Zool. Soc.* 1858, p. 529; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 230, 1862; *Sterndale, Mamm. Ind.* p. 489, 1884; *Przewalski, Cat. Zool. Coll.* p. 13, 1887.

Poëphagus mutus, *Przewalski, Reis. in Tibet*, p. 72, 1884, *Cat. Zool. Coll.* p. 13, 1887.

Bos (Poëphagus) grunniens, *Huet, Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 334, 1891; *Lydekker, Game Animals of India, etc.* p. 76, 1907, *Cat. Hume Bequest Brit. Mus.* p. 3, 1913; *Ward, Records of Big Game*, ed. 6, p. 437, 1910.

Bos (Bison) grunniens, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 51, pl. iv, 1898, *Great and Small Game of Europe, etc.* p. 122, 1901.

YAK.

Typical locality unknown; species based on domesticated breed.

Build massive; shoulder-height in adult bulls at least 5½ feet, and reported in some instances to be nearly 6 feet. Withers forming a conspicuous hump, behind which the back is nearly straight. Muzzle and ears relatively small; no dewlap; limbs short and stout, terminating in large, broad hoofs. Horns slightly compressed at base in adult bulls, but otherwise nearly circular in section and smooth, curving at first upwards and outwards, then forwards, and finally

inwards and upwards, frequently with a more or less marked backward inclination at the tips. Those of cows much more slender. Hair of head and upper-parts comparatively short and smooth, but on lower part of flanks elongated into a pendent fringe extending across shoulders and thighs; a tuft of long hair on chest, and sometimes a shorter one on withers; lower half of tail enveloped in a mass of still longer hair, reaching somewhat below hocks. Colour (in wild race and

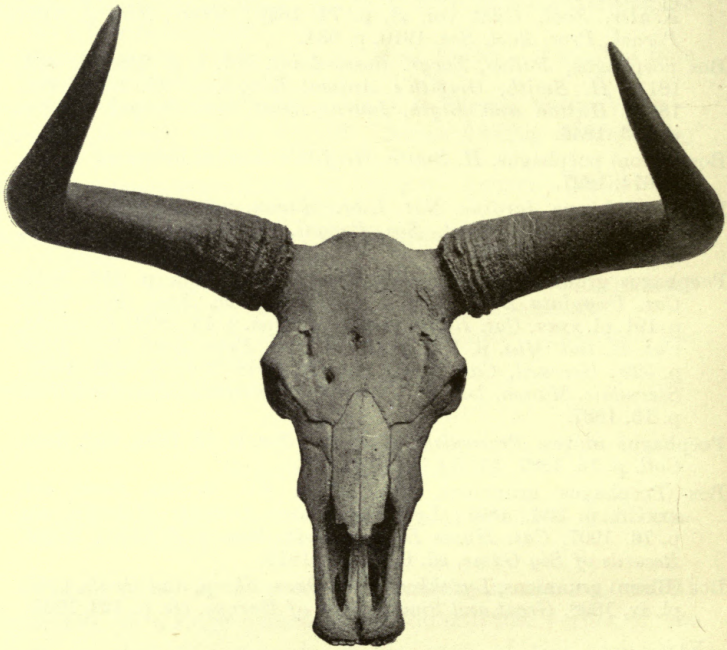


FIG. 14.—SKULL AND HORNS OF YAK (*Bos grunniens*).

pure-bred tame animals) uniformly blackish brown, with the exception of a little white in the neighbourhood of the muzzle, a sprinkling of grey on the head and face of old individuals, and a tendency to rusty on the back of aged bulls.

The grunting sound from which the yak takes its specific name is stated by Przewalski to be restricted to the tame breeds, one of which apparently forms the type; the wild race may be known as—

Bos grunniens mutus.

Typical locality Tibet.

Wild yak range from the eastern part of Ladak, in the neighbourhood of Chang-Chenmo (where they now appear to be exterminated) as far east as Kan-su and northwards to the Kuen-lun, at elevations between 14,000 and 20,000 feet.

* *. Skin, mounted. Ladak.

Presented by Capt. E. Smyth.

99. 6. 20. 1. Skin, small, mounted. Ladak.

Presented by Major P. H. G. Powell-Cotton, 1899.

45. 1. 8. 270. Skin, bad condition. Tibet.

Presented by B. H. Hodgson, Esq., 1845.

51. 7. 16. 2. Skin, bad condition. Ladak. Shot by Gen. (then Capt.) Strachey.

Presented by the Hon. East India Co., 1851.

91. 11. 15. 1. Skin, female. Ladak.

Presented by H. C. V. Hunter, Esq., 1891.

67. 2. 24. 6. Skeleton. Ladak (?). *Purchased,* 1867.

45. 1. 8. 101. Skull, with horns. Tibet.

Presented by B. H. Hodgson, Esq., 1845.

45. 1. 8. 102. Skull, with horns. Tibet. *Same history.*

45. 1. 8. 103. Skull, with horns, female (? domesticated).* (?) Tibet. *Same history.*

45. 1. 8. 105. Frontlet and horns. Tibet. *Same history.*

58. 6. 24. 177. Skull, with horns. North of Sikhim.

Same donor, 1858.

58. 6. 24. 152. Skull, with horns, female. *Same history.*

51. 12. 22. 1. Frontlet and horns. Ladak; shot by Gen. (then Capt.) Strachey.

Presented by the Hon. East India Co., 1851.

79. 11. 21. 17. Skull, with horns. North of Sikhim; collected by B. H. Hodgson, Esq.

Transferred from India Museum, 1879.

91. 8. 7. 216. Skull, with horns. Tibet, northward of Sikhim; collected by L. Mandelli, Esq.

Presented by A. O. Hume, Esq., C.B., 1891.

* Certain other registered specimens, belonging, at least for the most part, to domesticated animals, are not entered.

91. 8. 7. 217. Skull, with horns. Niti side of Hundes, Tibet; shot by N. Troup, Esq. *Same history.*

91. 8. 7. 218. Skull, with horns. Angirtakshin Pass, Kuen-lun (94° E. 35° N.); collected by A. D. Casey, Esq. *Same history.*

91. 8. 7. 219. Skull, with horns. Kuen-lun; collected by A. Dalgleish, Esq. *Same history.*

91. 8. 7. 220. Skull, with horns. Hundes, Tibet; collected by Mr. Troup. *Same history.*

12. 10. 31. 85. Skull, with horns (fig. 14). Angirtakshin Pass; collected by Mr. Dalgleish. Length of horns 38¾, girth 38¾, tip-to-tip 26½ inches. The maximum known horn-length is stated to be 39 inches.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

4. Subgenus **BISON.**

Bison, *H. Smith, Griffith's Animal Kingdom*, vol. v, p. 373, 1827; *Gray, Cat. Ungulata Brit. Mus.* p. 35, 1852.

Urus, *Bojanus, Nova Acta Acad. Cæs. Leop.-Car.* vol. xiii, pp. 413, 428, 1827; *Swainson, Classif. Quadrupeds*, p. 279, 1843; nec *H. Smith.*

Bonasus, *Wagner, Schreber's Saügthiere, Suppl.* vol. iv, p. 515, 1844.

Nearly allied to *Poëphagus*, but the long hair concentrated on the head and fore-quarters, where it forms a mane on the neck, a fringe on the throat, and a mantle on the shoulders; the tail, which reaches to the hocks or somewhat below, tufted only near the tip; and the line of the back falling away more or less markedly towards the hind-quarters. Colour brownish, with a tinge of plum. Skull shorter and wider than in *Poëphagus*, with the orbits more approximated to the bases of the horn-cores and more tubular, the frontal region more convex, and the nasals much shorter and wider. Horns of the same general type, but smaller. Ribs fourteen pairs as in *Poëphagus*.*

The range formerly included a large part of Europe and Western North America.

* Owen (*Brit. Foss. Mamm. and Birds*, p. 493, 1846, and *Anatomy of Vertebrates*, vol. ii, p. 462, 1866) stated that there are fifteen pairs in *B. bison;* a statement that has been much copied. See Allen, *Mem. Kentucky Geol. Surv.* vol. i, pt. 2, p. 2, 1876.

The two species are distinguished as follows:—

A. Hind-quarters well developed; colour brownish; horns relatively long; ears not concealed by mane ..... *B. bonasus.*

B. Hind-quarters very low and weak; colour blackish; horns shorter; ears buried in mane; orbits more tubular..... *B. bison.*

V. BOS (BISON) BONASUS.

Bos bonasus, *Linn. Syst. Nat.* ed. 10, p. 71, 1757, ed. 12, vol. i, p. 99, 1766; *Radde, Proc. Zool. Soc.* 1893, p. 175; *Satunin, Zool. Jahrb. Syst.* vol. ix, p. 104, 1896; *Buxton, Proc. Zool. Soc.* 1899, p. 64; *Westburg, Arb. Ver. Riga*, 1899, p. 1; *Lydekker, The Ox and Its Kindred*, p. 209, 1912.

Bos urus, *Boddaert, Elenchus Anim.* p. 150, 1788; *Fischer, Synop. Mamm.* p. 497, 1839; *Clermont, Quadr. and Rept. Europe*, p. 144, 1859; *Huet, Bull. Soc. Acclim. Paris*, vol. xiii, p. 3, 1891; *Ward, Records of Big Game*, p. 279, 1896; nec *Linn.* 1757 and 1766.

Bos bison, *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 398, 1827; *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 154, 1846; *Blasius, Säugethiere Deutschlands*, p. 492, 1857, nec *Linn.*

Bos (Bison) bison, *H. Smith, Griffith's Animal Kingdom*, vol. v, p. 373, 1827.

Urus nostras, *Bojanus, Nova Acta Acad. Cæs. Leop.-Car.* vol. xiii, p. 413, 1827.

Bison europæus, *Owen, Proc. Zool. Soc.* 1848, p. 126; *Rütimeyer, Verh. Ges.-Basel*, ser. 2, vol. iv, p. 339, 1865, *Abh. schweiz. pal. Ges.* vol. v, p. 139, 1878; *Dawkins, Early Man in Britain*, p. 98, 1880; *Nehring, Tundren u. Steppen*, p. 206, 1890; *Schiemenz, Biol. Centralblatt*, vol. xvii, p. 479, 1897; *nec* Bos europæus, *Gmelin.*

Bison bonassus, *Gray, Knowsley Menagerie*, p. 48, 1850, *Cat. Ungulata Brit. Mus.* p. 36, 1852, *Cat. Ruminants Brit. Mus.* p. 14, 1872; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 229, 1862.

Bison bonasus, *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 232, 1884; *Büchner, Mém. Acad. St. Pétersb.* ser. 8, vol. iii, No. 2, 1896; *Westberg, Festschrift Ver. Riga*, 1896, p. 267, *Arb. Ver. Riga*, ser. 2, vol. viii, p. 1, 1899; *Buxton, Proc. Zool. Soc.* 1899, p. 64; *Vrublevskij, Mëss. méd. vetérin. soz. St. Péterb.* vol. xix, p. 25, 1908, vol. xxi, p. 286, 1909; *Grevé, Balt. weidm.-vet.* vol. v, p. 361, 1909; *Hilzheimer, Mitt. K. Nat.-kab. Stuttgart*, 1909, p. 252; *Trouessart, Faune Mamm. Europe*, p. 243, 1910.

Bos (Bison) bonasus, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 64, pl. v, 1898, *Game Animals of Europe, etc.* p. 115, 1901; *Ward, Records of Big Game*, ed. 6, p. 433, 1910.

Bonasus europæus, *Yermoloff, Smithsonian Inst. Rep.* 1906, p. 345.

Bison: Zubr.

Typical locality probably Bielowitza, Lithuania.

Height at shoulder from 6 feet to 6 feet 2 inches; hind-quarters relatively high, pasterns long, tail reaching

hocks or below. Horns, black, relatively long and slender, curving upwards, forwards, and inwards, set well forward on the relatively flat and broad forehead. Mane of males in summer coat curly, moderately long, and not extending very far back on body, leaving the thickly fringed ears free, and forming a larger and thicker mass on head, neck, throat, and middle line of chest. In females restricted to nape, forehead, middle of lower part of face, and median line of chest. Colour brown, with a tinge of plum-colour.

The species, which is divided into the two undermentioned races, was formerly spread over a large part of Europe, but is now restricted to the Bielowitza Forest of Lithuania (Grodno) and the Caucasus. The last East Prussian bison was killed in 1755.

A.—Bos bonasus bonasus.

Characters those given under the heading of the species.

Now restricted to the Bielowitza Forest of Lithuania.

45. 10. 13. 1. Skin, mounted. Bielowitza.
Presented by the Tsar of Russia, 1845.

45. 10. 13. 2. Skeleton, mounted. Bielowitza.
Same history.

* * * *. Immature male, mounted in recumbent posture. Bielowitza. *No history.*

B.—Bos bonasus caucasius.

Bison bonasus, var. caucasia, *Grevé*, *Zool. Beobachtungen*, vol. xlvii, p. 269, 1906.

Bison caucasicus, *Hilzheimer*, *Mitt. k. Nat.-kab. Stuttgart*, 1909, p. 252; *Trouessart*, *Faune Mamm. Europe*, p. 243, 1910.

Bos bonasus caucasicus, *Ward*, *Records of Big Game*, ed. 6, p. 433, 1910; *Lydekker*, *The Ox and Its Kindred*, p. 215, 1912.

Bison bonasus caucasicus, *Filatov*, *Mém. Ac. Sci. St. Pétersb.* vol. xxx, No. 8, 1912.

Typical locality Caucasus.

Very similar in external appearance to typical race, but perhaps somewhat more lightly built, with less long hair on the fore-quarters. No distinctive characters given by Grevé when naming this race. According to Hilzheimer, the skull, although it retains the heavy hind portion of the mandible of the typical race, approximates in many features—more

especially the form and relations of the lachrymal—so markedly to the American species that it is regarded by him as more nearly related to the latter than to the former. It has, however, all the essential characteristics of *B. bonasus*; and, on the assumption that the ancestors of *B. bison* reached America by way of Bering Strait, it is only natural to expect that the Caucasian bison, as the most eastern representative of *B. bonasus*, should exhibit an approximation to the American species.

This race is now restricted to an area of about 125 miles in diameter on the northern flank of the main range of the Caucasus in the neighbourhood of the sources of the rivers Laba and Biellaia, extending eastwards to the head-waters of the Zellentchak.

92. 3. 15. 1. Skin and skeleton, mounted. Western Caucasus. Height 5 feet 11 inches.

Presented by St. George Littledale, Esq., 1892.

92. 3. 15. 2. Skin and skeleton, female, mounted. Western Caucasus. *Same history.*

VI. BOS (BISON) BISON.

Bos bison, *Linn. Syst. Nat.* ed. 10. p. 72, 1757, ed. 12, vol. i, p. 99, 1766; *Lydekker, The Ox and Its Kindred*, p. 216, 1912.

Bos americanus, *Gmelin, Syst. Nat.* vol. i, p. 204, 1788; *Richardson, Fauna Bor. Amer.* p. 279, 1829; *Jardine, Naturalist's Library, Mamm.* vol. iv, p. 252, 1836; *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 154, 1846; *Baird, Mamm. N. America*, p. 682, 1859; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 230, 1862; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 131, 1891; *Huet, Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 344, 1891; *Flower and Lydekker, Study of Mammals*, p. 362, 1891; *Ward, Records of Big Game*, p. 269, 1896.

Bos (Bison) americanus, *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 401, v, p. 374, 1827.

Urus americanus, *Swainson, Classif. Quadrupeds*, p. 280, 1835.

Bos (Bonasus) americanus, *Wagner, Schreber's Säugthiere, Suppl.* vol. iv, p. 516, 1844; *Turner, Proc. Zool. Soc.* 1850, p. 174.

Bison americanus, *Gray, Knowsley Menagerie*, p. 49, 1850, *Cat. Ungulata Brit. Mus.* p. 38, 1852, *Cat. Ruminants Brit. Mus.* p. 14, 1872; *Rütimeyer, Denkschr. schweiz. Ges.* vol. xxii, art. 3, p. 91, 1867, *Abh. schweiz. pal. Ges.* vol. v, p. 189, 1878; *Allen, Mem. Mus. Harvard*, vol. iv, p. 36, 1876; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 231, 1884; *Hornaday, Rep. U.S. Nat. Mus.* 1886–87, p. 378, 1889; *Herrick, Mamm. Minnesota*, p. 260, 1892; *Elliot, Synop. Mamm. N. Amer.* (*Zool.*

Publ. Field. Mus. vol. ii) p. 49, 1901; *Hilzheimer, Mitt. K. Nat.-kab. Stuttgart*, 1912, p. 252.

Bison bison, *Merriam, N. Amer. Fauna*, No. 5, p. 81, 1891; *Rhoads, Amer. Naturalist*, vol. xxxviii, p. 526, 1894, *Proc. Acad. Philadelphia*, 1895, p. 244, 1897, p. 501; *Elliot, Suppl. Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 486, 1901, *Check-List. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. vi) p. 57, 1905; *Stone and Cram, American Animals*, p. 66, 1903.

Bos (Bison) bison, *Ward, Records of Big Game*, ed. 6, p. 435, 1910; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 79, 1898, *Great and Small Game of Europe, etc.* p. 303, 1901.

American Bison.

Typical locality Texas.

Smaller than *B. bonasus* (shoulder-height in adult males about 5 feet, 9 inches); with a relatively larger head, shorter horns—of which the tips in old bulls become much worn—lower and weaker hind-quarters, a great mass of long hair on crown of head and chin, and heavy fringes on upper part of fore-legs of adult bulls. Long hair of head concealing large ears and that of fore-quarters extending a considerable distance along middle line of back and behind shoulder in adult bulls; summer coat of hind part of body quite short and smooth, without the curliness of that of *B. bonasus*. Colour much darker than in latter, being blackish brown, passing into black on the long hair of the fore-quarters and head. Horns set lower down on skull than in European species, and skull with a more convex frontal region, and still more tubular orbits.

The range formerly included the area lying between the Rocky Mountains and the Alleghanies, and from Mexico northwards to the Peace River; the head-quarters being the prairies between the Saskatchewan and the Rio Grande.

A.—Bos bison bison.

Characters those of the species; ears and tail-tip brown.

The range includes that portion of the distributional area of the species lying to the southward of the tract inhabited by *B. b. athabascæ*. Typical locality Texas.

*. Skin, mounted. Yellowstone. Collected by Dr. J. J. Audubon. *Purchased.*

* *. Skin, immature, mounted.

Presented by the Zoological Society.

* * *. Young, mounted. *Same history.*

43. 11. 28. 1. Immature skin.
Presented by the Hudson Bay Co., 1843.

94. 4. 15. 1. Head, mounted. Colorado (1878).
Presented by the Lord Walsingham, 1894.

* * * *. Skeleton (skull exhibited).
Presented by the Earl of Derby, about 1848.

65. 12. 8. 24. Skeleton, mounted.
Presented by the Zoological Society, 1865.

65. 12. 8. 26. Skeleton of female, immature.
Same history.

56. 11. 22. 102. Skeleton, female (skull exhibited).
Presented by the Zoological Society, 1850.

96. 10. 23. 1. Skeleton, young. Bred in Northumberland. *Presented by C. J. Leyland, Esq.*, 1896.

9. 3. 6. 1. Skull, with horns. Bred at Woburn Abbey.
Presented by the Duke of Bedford, K.G., 1909.

99. 4. 1. 1. Skull, with horns. N. America.
Presented by Lady Hall, 1899.

2. 8. 2. 18. Skull. Southwood Hills, Assiniboina; collected by E. Hollis, Esq. *Purchased*, 1902.

B.—Bos bison athabascæ.

Bison bison athabascæ, *Rhoads, Proc. Acad. Philadelphia*, 1897, p. 498; *Elliot, Suppl. Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 486, 1901, *Check-List Mamm. N. Amer.* (*op. cit.* vol. vi) p. 57, 1905.

Bos bison athabascæ, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 90, 1898, *Great and Small Game of Europe, etc.* p. 308, 1901, *The Ox and Its Kindred*, p. 216, 1912; *Ward, Records of Big Game*, ed. 6, p. 435, 1910.

Bison americanus athabascæ, *Elliot, Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 49, 1901.

Typical locality 50 miles from Fort Resolution, Great Slave Lake.

Said to be rather larger and generally darker than the typical race, with the horns longer, and more slender. Colour light brown, shading to dark brown, and becoming nearly black on head, under-parts, and limbs, with the ears and tail-tip black.

Typically from a spot 50 miles south-west of Fort

Resolution, Great Slave Lake; but formerly ranging from the East Slope of the Rocky Mountains to the 95th meridian, and from lat. 63° to lat. 55° N.; probably southwards along the Rocky Mountains to the United States.

5. Subgenus **BUBALUS.**

Bubalus, *H. Smith, Griffith's Animal Kingdom*, vol. v, p. 371, 1827, as a subgenus; *Gray, Cat. Ungulata Brit. Mus.* p. 23, 1852; *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 191, 1911.

Anoa, *H. Smith, Griffith's Animal Kingdom*, vol. v, p. 355, 1827, as a subgenus; *Gray, Cat. Ungulata Brit. Mus.* p. 29, 1852.

Syncerus, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xvi, p. 709, 1847; *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Buffelus, *Rütimeyer, Verh. Ges. Basel*, ser. 2, vol. iv, p. 334, 1865, *Denkschr. schweiz. Ges.* vol. xxii, pt. 2, art. 3, p. 52, 1867, *Abh. schweiz. pal. Ges.* vol. v, p. 189, 1878; *Matschie, Säugeth. deutsch. Öst.-Afrika*, p. 107, 1896.

Probubalus, *Rütimeyer, Verh. Ges. Basel*, ser. 2, vol. iv, p. 334, 1865, *Abh. schweiz. pal. Ges.* vol. v, p. 189, 1878.

Planiceros, *Gray, Cat. Ruminants Brit. Mus.* p. 10, 1872, as subgenus.

Synceros, *Gray, Cat. Ruminants Brit. Mus.* p. 12, 1872, as subgenus.

Build heavy, and line of back nearly straight; horns more or less markedly triangular for the greater part of their length, situated low down on the skull, of which the frontal region is highly convex. Ears large, muzzle broad, limbs short and stout, tail tufted and reaching about to hocks; hair sparse in adults. Thirteen pairs of ribs.

Opinions vary greatly as to the number of species of buffaloes, but if all the African forms be included under a single specific heading, the following synopsis will serve to distinguish the well defined species.

A. Hair of middle line of back directed forwards from haunches to nape; ears relatively small; skull relatively long and narrow, with vomer fused to palatines.
  a. Size large or medium, horns directed more or less outwardly ..... *Bos bubalis.*
  b. Size medium, horns directed more upwardly *Bos mindorensis.*
  c. Size small, horns directed mainly upwards, in a V-like manner ..... *Bos depressicornis.*

B. Hair of middle line of back normally directed backwards from nape to rump; ears large and heavily fringed; skull relatively broad and short, with vomer free from palatines ..... *Bos caffer.*

VII. BOS (BUBALUS) BUBALIS.

Bos bubalis, *Linn.*, *Syst. Nat.* ed. 10, p. 72, 1757, ed. 12, vol. i, p. 99, 1766.

Bos bubalus, *Gmelin*, *Syst. Nat.* vol. i, p. 206, 1788; *H. Smith*, *Griffith's Animal Kingdom*, vol. iv, p. 392, 1827; *Hutton*, *Journ. Asiat. Soc. Bengal*, vol. xv, p. 142, 1846; *Sundevall*, *K. Svenska Vet.-Ak. Handl.* 1844, p. 153, 1846; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 129, 1891; *Blanford*, *Fauna Brit. India*, *Mamm.* p. 491, 1891; *Hose*, *Mammals of Borneo*, p. 64, 1893; *Ward*, *Records of Big Game*, p. 266, 1896; *Pocock*, *Proc. Zool. Soc.* 1910, p. 934.

Bos arnee, *Kerr*, *Linn.'s Animal Kingdom*, p. 336, 1792; *Gray*, *Proc. Zool. Soc.* 1855, p. 17, pl. xi.

Bos buffelus, *Blumenbach*, *Handbuch Naturgeschichte*, ed. 10, p. 121, 1821; *Flower and Lydekker*, *Study of Mammals*, p. 361, 1891.

Bos arni, *H. Smith*, *Griffith's Animal Kingdom*, vol. iv, p. 388, 1827; *Sundevall*, *K. Svenska Vet. Ak. Handl.* 1844, p. 153, 1846.

Bos (Bubalus) arnee, *H. Smith*, *op. cit.* vol. v, p. 372, 1827.

Bos (Bubalus) bubalus, *H. Smith*, *loc. cit.* 1827.

Bubalus arnee, *Jardine*, *Naturalist's Library—Mamm.* vol. iv, p. 243, 1836; *Cantor*, *Journ. Asiat. Soc. Bengal*, vol. xv, p. 273, 1846.

Bubalus arna, *Hodgson*, *Journ. Asiat. Soc. Bengal*, vol. x, pp. 469 and 921, 1841, xvi, p. 709, 1847; *Horsfield*, *Cat. E. Ind. Mus.* p. 179, 1851.

Bubalus buffelus, *Gray*, *List Mamm. Brit. Mus.* p. 152, 1843, *Cat. Ungulata Brit. Mus.* p. 25, 1852, *Cat. Ruminants Brit. Mus.* p. 9, 1872; *Kelaart*, *Prodromus Faunæ Zeylan.* p. 87, 1852; *Gerrard*, *Cat. Bones Mamm. Brit. Mus.* p. 226, 1862; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 229, 1884; *Lydekker*, *Cat. Foss. Mamm. Brit. Mus.* pt. ii, p. 28, 1885; *Huet*, *Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 7, 1891.

Bos kerabau, *Sundevall*, *K. Svenska Vet.-Ak. Handl.* 1844, p. 153, 1846.

Buffelus indicus, *Rütimeyer*, *Verh. Ges. Basel*, ser. 2, vol. iv, p. 334, 1865, *Denkschr. schweiz. Ges.* vol. xxii, pt. 2, art. 3, p. 52, 1867, *Abh. schweiz. pal. Ges.* vol. v, p. 189, 1878.

Bubalus indicus, *Rütimeyer*, *Denkschr. schweiz. Ges.* vol. xxii, pt. 2, art. 2, p. 32, 1867; *Steere*, *Proc. Zool. Soc.* 1888, p. 415.

Buffelus sondaicus, *Rütimeyer*, *Denkschr. schweiz. Ges.* vol. xxii, pt. 2, art. 2, p. 52, 1867, *Abh. schweiz pal. Ges.* vol. v, p. 189, 1878, *nec* Bos sondaicus, *Müller and Schlegel.*

Bubalus arni, *Jerdon*, *Mamm. Ind.* p. 307, 1867; *Sterndale*, *Mamm. Ind.* p. 490, 1884.

Bos (Bubalus) buffelus, *Blanford*, *Journ. Asiat. Soc. Bengal*, vol. xxxvi, p. 195, 1867.

Bubalus kerabau, *Brehm*, *Tierleben*, ed. 3, *Säugethiere*, vol. iii, p. 327, 1891.

Bubalus bubalus, *Meyer*, *Abh. Mus. Dresden*, 1896–97, No. 8, p. 14, 1896; *Matschie*, *Deutsche Jäger-Zeitung*, vol. lix, p. 103, 1912.

Bos (Bubalus) bubalis, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 118, pl. ix, 1898, *Game Animals of India, etc.* p. 83, 1907, *The Ox and Its Kindred*, p. 223, 1912, *Cat. Hume Bequest Brit. Mus.* p. 4, 1913; *Ward*, *Records of Big Game*, 6th ed. p. 427, 1910.

Bubalus bubalis, *Hollister*, *Philippine J. Sci.* vol. vii, p. 45, 1912.

Indian Buffalo: Arni.

Typical locality unknown.

Size typically large, shoulder-height reaching, it is stated, as much as 6½ feet. Hair of middle line of back and neck directed forwards from haunches; ears relatively

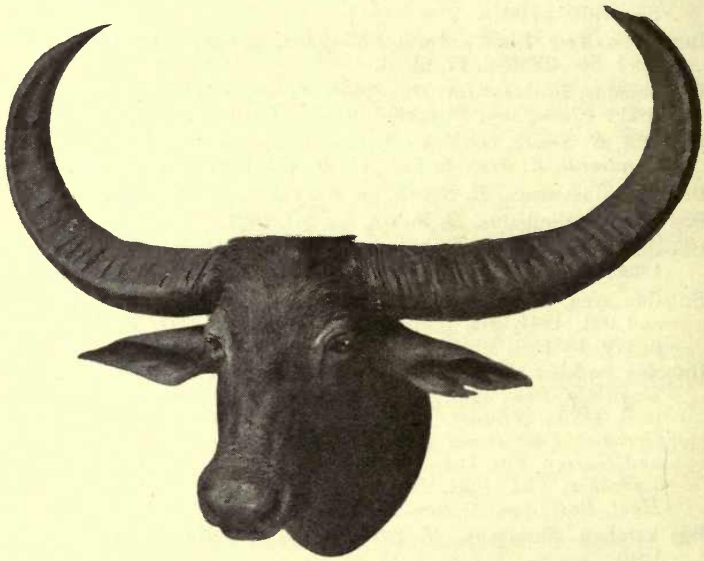


Fig. 15.—Head of Indian Buffalo (*Bos bubalis*).

small and not heavily fringed. Horns typically very large, flattened, transversely rugose, widely separated at the base, and either curving in a crescentic form or directed mainly outwards, with an upward and somewhat forward curvature near the tips. Throughout their length the horns depart but little from one plane. Horns of females more slender, and not infrequently longer than those of males. Skull relatively light, narrow, and long, with a nearly straight facial profile; nasals elongated and slender, narrow near the middle, and projecting on either side considerably beyond the middle suture, and their longest diameter laterally; vomer fused with

palatines; auditory (tympanic) bullæ relatively small; crowns of upper molars nearly square. Colour typically dark ashy, approaching black, but occasionally brown dun.

This buffalo exists in a wild state over a large part of India, exclusive of the south and west, as well as in northern Ceylon, while it may also occur on parts of the mainland east of the Bay of Bengal, as it apparently does in Borneo.

The following races, or phases, are recognised:—

A.—Size large.
  a. Colour blackish.
    a'. Horns crescentic, or subcircular ..... *B. b. bubalis.*
    b'. Horns directed mainly outwards ..... *B. b. macroceros.*
  b. Colour brown dun ..... *B. b. fulvus.*
B.—Size medium..... *B. b. hosei.*

A.—Bos bubalis bubalis.

Bubalus buffelus spirocerus, *Hodgson*, *Journ. Asiat. Soc. Bengal*, vol. x, p. 912, 1841, xvi, p. 710, 1847.

Bos bubalis bubalis, *Lydekker*, *Cat. Hume Bequest Brit. Mus.* p. 4, 1913.

Characters generally those of the species, with the horns crescentic (fig. 15).

The range includes those portions of Peninsular India lying within the distributional area of the species, and at least part of Assam and Kuch-Behar.

44. 10. 22. 1. Skin, new born calf, mounted.
Presented by the Zoological Society, 1844.

96. 6. 29. 1. Head, mounted. India. *Purchased*, 1896.

84. 1. 22. 4. Skeleton, with horns, mounted. Assam. Shot by G. P. Sanderson, Esq. *Purchased*, 1884.

39. 4. 19 & 1. Frontlet and horns.
Purchased at Stevens' Auction Rooms, 1839.

45. 1. 8. 142. Skull, with horns, female. Upper India.
Presented by B. H. Hodgson, Esq., 1845.

45. 1. 8. 143. Skull, with horns. Upper India.
Same history.

45. 1. 8. 146. Frontlet and horns. Upper India.
Same history.

45. 1. 8. 147. Frontlet and horns. Upper India.
Same history.

*. Skull, with horns, female. Upper India.
Same history.

604, *a*. Frontlet and horns. India. *No history.*

604, *b*. Skull, with horns. India.
No history (? Hodgson collection).

604, *d*. Skull, with horns. No locality. *No history.*

79. 11. 21. 4. Skull, with horns. India.
Transferred from India Museum, 1879.

79. 11. 21. 5. Skull, with horns. India. *Same history.*

79. 11. 21. 6. Skull, with horns. India. *Same history.*

79. 11. 21. 7. Skull, with horns. India. *Same history.*

79. 11. 21. 8. Skull, with horns. India. *Same history.*

79. 11. 21. 9. Skull, with horns. India. *Same history.*

79. 11. 22. 10. Skull, with horns. India. *Same history.*

91. 8. 7. 213. Skull, with horns. Dhubri, Assam.
Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 214. Skull, with horns, female. Purneah.
Same history.

12. 10. 31. 84. Skull, with horns. Dhubri, Assam. This specimen is No. 20 in Ward's list. Length of horns, outside, 56¼, girth 21½, tip-to-tip interval 40 inches.
Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 83. Skull, with horns, female. Gowhatti, Assam. This specimen stands 29 in Ward's list. Outside length of horns 54½, girth 12¾, tip-to-tip interval 69¾ inches.
Same history.

5. 7. 29. 1. Skull, with horns, female. Kuch-Behar.
Presented by H.H. the Maharaja of Kuch-Behar, 1905.

7. 10. 27. 1. Skull, with horns. Baraitch district.
Presented by Mrs. J. G. Anderson, 1907.

NOTE.—Several specimens entered in Gray's *Hand-List of Edentate, Thick-Skinned and Ruminant Animals*, belonging to the Hardwicke, Lidth de Jeude, and other collections, have been omitted from the above list, as being obviously referable to domesticated breeds.

B.—Bos bubalis macroceros.

Bubalus buffelus macroceros, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. x, p. 912, 1841, xvi, p. 710, 1847.

Bos bubalis macroceros, *Lydekker, Game Animals of India, etc.* p. 84, 1897, *The Ox and Its Kindred*, p. 228, 1912; *Ward, Records of Big Game*, ed. 6, p. 427, 1910.

(?) Bos palæindicus, *Falconer, Cat. Foss. Vert. Asiat. Soc. Bengal*, p. 230, 1859.

(?) Bos bubalis palæindicus, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 127, 1898.

Typical locality Assam.

Characterised by the great length and outward direction of the horns, which turn upwards only towards the extremities. Whether the difference in this respect from the typical representative of the species is of racial or merely of dimorphic value, has yet to be determined.

These long-horned buffaloes are natives of Assam and Kuch-Behar; but horns of a very similar type occur in Malaya, although it is not known whether they belong to wild or tame animals.

604, *d.* Detached horns. Mentioned by Sloane in *Phil. Trans.*, 1727, p. 222; figured in Griffith's *Animal Kingdom*, pl. ccxxxi, fig. 2.

These horns, which measure $77\frac{3}{8}$ inches in length, and are the largest specimens of their kind, were discovered in a cellar in Wapping by a Mr. Doyle, who gave them to Sir Hans Sloane (see *Proc. Zool. Soc.* 1855, p. 17). *Sloane Collection.*

55. 1. 10. 1. Skull, with horns. Fezpur, Central Assam. Length of horns $65\frac{3}{4}$ inches. Figured *Proc. Zool. Soc.* 1855, p. 17, pl. xi. *Presented by Col. J. Mathie*, 1855.

5. 7. 29. 1. Skull, with horns, female. Kuch-Behar. *Presented by H.H. the Maharaja of Kuch-Behar*, 1905.

C.—Bos bubalis fulvus.

Bos bubalus *var.* fulvus, *Blanford, Fauna Brit. India, Mamm.* p. 492, 1891.

Bos bubalis fulvus, *Lydekker, Great and Small Game of India, etc.* p. 77, 1900, *Game Animals of India, etc.* p. 88, 1907, *Cat. Hume Bequest Brit. Mus.* p. 5, 1913; *Ward, Records of Big Game*, 6th ed. p. 427, 1910.

Typical locality Upper Assam.

Characterised by the brownish dun colour of the hide,

and the form of the skull, in which the forehead is much more convex than in the typical race, and the profile of the face consequently concave, while the muzzle (that portion in front of the orbits) is relatively shorter, and the length of the nasals is less than the interval between their upper extremities and the vertex of the skull, whereas in the typical race it is longer. In these cranial features the Assam buffalo approximates to *B. caffer*.

The range includes the Mishmi Hills as well as Upper Assam.

91. 8. 7. 215. Skull, with horns. Mishmi Hills. Co-type, the other being a mounted head in the Indian Museum, Calcutta.

Presented by A. O. Hume, Esq., C.B., 1891.

D.—Bos bubalis hosei.

Bos bubalis hosei, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 126, 1898.

Typical locality Sarawak, Borneo.

Intermediate in size and general appearance between *B. b. bubalis* and *B. mindorensis*, with (in the type specimen) a white gorget on the throat. Fore-legs from above knees to hoofs and hind-legs from below hocks mainly dirty white; front of thighs also whitish. Horns relatively short.

In North Borneo wild buffaloes are stated by Dr. C. Hose to occur in the neighbourhood of the Miri and Baram Rivers.

94. 6. 12. 8. Skin, mounted. Sarawak; collected by Dr. C. Hose. Type. Also skull of same. *Purchased*, 1894.

The following name has been proposed, on the evidence of a skull and horns, for a buffalo from N. India:—

Bubalus bubalus septentrionalis, *Matschie, Deutsche Jäger-Zeitung*, vol. lix, p. 103, 1912.

The undermentioned name has been applied to a buffalo reputed to come from the island of Busuanga, in the Calamianes group of the Philippines:—

Bubalus moellendorffi, *Nehring, Sitzber. Ges. nat. Freunde*, 1894, p. 185.

It has, however, been stated by a resident that there are no wild buffaloes in the Calamianes group (see *Lydekker, Wild Oxen, Sheep, and Goats*, p. 130).

Bubalus mainitensis, *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. ii, p. 205, 1888, appears to be based on a domesticated buffalo from Mindanao, Philippines.

VIII. BOS (BUBALUS) MINDORENSIS.

Bubalus mindorensis, *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. ii, pp. 4 and 50, 1888, *ibid.* p. 204, pl. xix, 1894; *Heller, Abh. Mus. Dresden*, 1890–91, No. 2, pp. 3 and 31, 1890*; *Nehring, Zool. Anzeiger*, 1890, p. 448; *Jentink, Notes Leyden Mus.* vol. xvi, p. 199, 1894; *Meyer, Abh. Mus. Dresden*, 1896–97, No. 6, p. 12, pls. vii and viii, 1896; *Thomas, Trans. Zool. Soc.* vol. xiv, p. 410, 1898; *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 191, 1912, *Philippine J. Sci.* vol. vii, p. 45, 1912.

Anoa mindorensis, *Steere, Proc. Zool. Soc.* 1888, p. 413; *Oustalet, Bull. Mus. Paris*, 1895, p. 202.

Probubalus mindorensis, *Steere, loc. cit.* 1888.

Bos mindorensis, *Lydekker, Royal Nat. Hist.* vol. ii, p. 206, 1894, *Geogr. Hist. Mamm.* p. 47, 1896, *The Ox and Its Kindred*, p. 238, 1912.

Bos (Bubalus) mindorensis, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 128, pl. x, 1908.

Mindoro Buffalo.

Typical locality Mindoro, Philippines.

A small, stoutly built species, in many respects intermediate between *B. bubalis hosei* and *B. depressicornis*. Horns short and stout, with deep irregular grooves and pits on the surface, directed mainly upwards, with the tips somewhat incurved; those of cows more slender and more widely separated on forehead; colour black. Hair less sparse than in the larger species, but showing the same reversal on middle line of back; general colour ashy black, sometimes tending to brown; a triangular patch on inner side of eye, one or two spots on side of lower jaw, lower lip, in some cases one or two gorgets on throat, inner side of ear, and a band or patch above hoof, whitish or greyish white. Head relatively shorter than in *B. bubalis;* ears rather small, with long hairs on inner margin. Shoulder height about 3½ feet.

92. 10. 8. 1. Adult, mounted. Mindoro; collected by Prof. J. B. Steere. *Purchased*, 1892.

* Separate copies are dated 1889.

IX. BOS (BUBALUS) DEPRESSICORNIS.

Antilope (Anoa) depressicornis, *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 293, v, p. 355, 1827.

Antilope depressicornis, *Quoy and Gaimard, Ann. Sci. Nat.* vol. xvii, p. 623, 1829, *Voyage de l'Astrolabe—Zool.* vol. i, p. 136, 1830.

Bos (Anoa) depressicornis, *Gray, Spicil. Zool.* p. 12, 1828.

Antilope (Taurotragus) depressicornis, *Wagner, Schreber's Säugthiere, Suppl.* vol. iv, p. 539, 1844.

Anoa depressicornis, *Swainson, Classif. Quadrupeds*, p. 286, 1835; *Gray, List. Mamm. Brit. Mus.* p. 153, 1843, *Cat. Ungulata Brit. Mus.* p. 29, 1852, *Cat. Ruminants Brit. Mus.* p. 13, 1872; *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 148, 1846; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 228, 1862; *Heller, Abh. Mus. Dresden*, 1890–91, No. 2, p. 5, 1890*; *Ward, Records of Big Game*, p. 281, 1896; *Lönnberg, Acta Soc. Upsal*, vol. iii, p. 1, 1903; *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 191, 1911.

Bubalus depressicornis, *Turner, Proc. Zool. Soc.* 1850, p. 178; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 228, 1884.

Probubalus celebensis, *Rütimeyer, Verhandl. Ges. Basel*, ser. 2, vol. iv, p. 334, 1865, *Denkschr. schweiz. Ges.* vol. xxii, pt. 2, art. 3, p. 52, 1867.

Bubalus (Anoa) depressicornis, *Rütimeyer, Denkschr. schweiz. Ges.* vol. xxii, pt. 2, art. 3, p. 26, 1867; *Hoffmann, Abh. Mus. Dresden*, 1887, No. 3, p. 26.

Probubalus (Anoa) celebensis, *Rütimeyer, Abh. schweiz. pal. Ges.* vol. v, p. 189, 1878.

Bos depressicornis, *Brehm, Tierleben*—ed. 3, *Säugethiere*, vol. iii, p. 448, 1891; *Flower and Lydekker, Study of Mammals*, p. 361, 1891; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 130, 1891; *Lydekker, The Ox and Its Kindred*, p. 231, 1912.

Bos (Bubalus) depressicornis, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 131, pl. x; *Ward, Records of Big Game*, ed. 6, p. 431, 1910.

ANOA.

Typical locality Celebes.

Smallest of all buffaloes; the height at the shoulder being about 3 feet 3 inches, and that at the withers slightly more. Horns of medium length, rising much below plane of occiput, almost straight, and directed upwards and outwards nearly in the plane of forehead, with sharply pointed tips. Ears relatively small, nearly bare at tips. Tail about reaching hocks. A woolly coat in the calves, which is shed in large fleecy masses, leaving the skin of adults almost bare, at least in males. Juvenile coat either blackish or bright golden brown; adult males black or blackish, but females

* Separate copies are dated 1889.

sometimes brown. White spots may be present above the hoofs, on the throat, hind part of neck, back, in front of eye, and on side of lower jaw; and there may be white on inner side of shanks. Hair of middle line of back reversed. Frequently only two pairs of lower premolars.

A.—Bos depressicornis depressicornis.

As the species was described on the evidence of a skull, it is of course impossible to know the colour of the skin in the typical race. It is, however, permissible to regard the ordinary black anoas as representing this race, and to take those devoid of white markings as typical. Such white markings certainly occur in the second race; but whether they may not also occur in some individuals of the present race cannot yet be determined.

Some of the undermentioned specimens may pertain to *B. d. fergusoni*.

607, *a*. Facial portion of skull and horns. Type; figured by Hamilton Smith. *Bequeathed by Gen. T. Hardwicke*, 1835.

607, *a**. Skin, mounted.
By exchange with Leyden Museum (?).

96. 6. 24. 1. Skin, mounted. Lipupang, North Celebes; collected by Dr. C. Hose. There are no white markings on the face or limbs. *Purchased*, 1896.

607, *h*. Skeleton, female, mounted. *Purchased.*

46. 5. 11. 1. Skull, with horns.
Purchased at Stevens' Auction Rooms, 1846.

46. 5. 11. 1*. Skull, with horns. Figured in Gray's *Catalogue of Ungulata*, 1852, pl. iii. *Same history.*

58. 5. 4. 5. Skull, with horns (length 12⅜ inches).
Presented by the Zoological Society, 1852.

60. 8. 26. 20. Immature skull. Collected by Dr. A. R. Wallace. *Purchased*, 1860.

60. 8. 26. 21. Young skull. Collected by Dr. Wallace.
Same history.

B.—Bos depressicornis fergusoni.

Bos depressicornis fergusoni, *Lydekker*, *Field*, vol. cvi, p. 378, 1905, *The Ox and Its Kindred*, p. 233, pl. xxiii, 1912.

Juvenile coat golden brown, this colour persisting in at least some of the cows; white markings on face and limbs.

This race is likewise restricted to Celebes, but probably inhabits a different area from the one in which the typical race is found.

0. 5. 26. 16. Skin, immature female. Type. The animal was living in 1900 in the Zoological Gardens at Trivandrum, India. *Presented by H. S. Ferguson, Esq.*, 1900.

8. 10. 22. 1. Skin. From an animal living with the last specimen at Trivandrum. *Same donor*, 1908.

The following name has also been published, but the present writer has not seen the description:—

Anoa quarlesi, *Ouwens, Bijdrage Zoogdieren Celebes, Batavia*, vol. xxii, p. 447, 1911.

X. BOS (BUBALUS) CAFFER.

Bos caffer, *Sparrman, K. Svenska Vet.-Ak. Handl.* vol. xl, p. 79, 1779; *Wagner, Schreber's Säugthiere*, vol. v, p. 1697, pl. ccci, 1844; *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 153, 1846; *Huet, Bull. Soc. Acclim. Paris*, vol. xxxviii. p. 338, 1891; *Flower and Lydekker, Study of Mammals*, p. 361, 1891; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 130, 1891, *Mamm. S. Africa*, vol. i, p. 254, 1900; *Nicolls and Eglington, Sportsman in South Africa*, p. 72, 1892; *Ward, Records of Big Game*, p. 261, 1896; *Lydekker, The Ox and Its Kindred*, p. 234, 1912; *Pocock, Proc. Zool. Soc.* 1910, p. 434.

Bos (Bubalus) caffer, *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 384, v, p. 371, 1827; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 94, pl. vii, 1898, *Game Animals of Africa*, p. 67, 1908; *Ward, Records of Big Game*, ed. 6, p. 418, 1910.

Bubalus caffer, *Jardine, Nat. Libr.—Mamm.* vol. iv, p. 237, 1836; *Gray, List Mamm. Brit. Mus.* p. 153, 1843, *Cat. Ungulata Brit. Mus.* p. 28, 1852, *Cat. Ruminants Brit. Mus.* p. 12, 1872; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 227, 1862; *Brooke, Proc. Zool. Soc.* 1873, p. 480, 1875, p. 457; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 230, 1884; *Pechuel-Loesche, Zool. Jahrb. Syst.* vol. iii, p. 707, 1888; *Bocage, J. Soc. Lisboa*, ser. 2, vol. i, p. 24, 1890; *Pousargues, Ann. Sci. Nat. Zool.* ser. 7, vol. iv, p. 86, 1897; *Matschie, Sitzber. Ges. nat. Freunde*, 1906, p. 161.

Buffelus caffer, *Matschie, Säugeth. Deutsch.—Öst.-Afrika*, p. 107, 1895.
Syncerus caffer, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

African Buffalo.

Typical locality Sunday River, Algoa Bay, South Africa.

Horns relatively shorter, less markedly triangular in section, less rugose, and typically more expanded and much more closely approximated at the base than in *B. bubalis*. Size and colour variable, the latter ranging from black to reddish or orange dun. Hair of middle line of back normally directed uniformly backwards. Ears large and heavily fringed with long hairs. Skull massive, relatively short and broad, with the facial profile markedly convex, the muzzle proportionately short and wide, the nasals also short and broad, with their greatest length in the middle line of the skull. Vomer free from palatines. Auditory, or tympanic, bulla large, projecting much beyond plane of inferior aspect of basioccipital.

The distributional area includes all such parts of Ethiopian Africa as are suited to the habits of these animals.

All the forms of African buffaloes appear to the writer to be local races of a single species, many of them probably intergrading. Whether all the forms to which separate names have been given—mostly on the evidence of the skull and horns—are really entitled to even racial distinction, the material in the Museum is insufficient to afford means of arriving at a definite conclusion. The extent to which buffalo-horns became worn down in old age is so great that, without a large series of specimens from the same localities for comparison, two races might easily be made from young and old individuals of one and the same form.

Although Dr. Matschie has attempted to make a "key" to the various races, from the evidence of the horns alone, it is really impossible at present to do this satisfactorily; but the races may be divided into two main groups from the characters of the horns.

GROUP I.

Horns bent sharply backwards a short distance from their bases, so that they do not lie in the same plane for any

appreciable portion of their length, frequently with a strong basal boss. Bodily size large; skin and hair black.

SUBGROUP i.

Horns, in place of curving immediately inwards at the point of maximum span, bending at first backwards.

A.—Bos caffer caffer.

Bos caffer typicus, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 97, 1898.

Syncerus caffer caffer, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typically from Sunday River, near Algoa Bay, whence the range extends northwards apparently to Zululand.

Horns without a prominent basal boss, and their smooth tips diminishing very rapidly in calibre and distinctly bent inwards and backwards; maximum span occuring where central axis of tips cuts the horns.

71. 7. 3. 8. Frontlet and horns, immature. Algoa Bay. From the locality, this specimen may be regarded as a typical example of the present race. *Purchased*, 1871.

52. 2. 15. 10. Frontlet and horns. South Africa. *Purchased* (?), 1852.

58. 5. 4. 9. Frontlet and horns. South Africa. *Presented by the Zoological Society*, 1858.

42. 4. 10. 14. Skull, with horns. Cape Colony. *Purchased*, 1842.

606, *b*. Skull, with horns. Locality unknown. Figured in Gray's *Catalogue*, 1852, pl. ii. *No history.*

606, *i*. Skull, with horns, female. Locality unknown. *No history.*

50. 11. 22. 101. Skeleton, mounted, belonging to this or one of the allied races. South Africa. *Presented by the Zoological Society*, 1850.

606, *c*. Very young skull, with the budding horns, and body-skin. Cape Colony; collected by Verreaux. *Purchased.*

B.—Bos caffer neumanni.

Bubalus neumanni, *Matschie*, *Sitzber. Ges. nat. Freunde*, 1906, p. 169.
Bos caffer neumanni, *Lydekker*, *Game Animals of Africa*, p. 71, 1908.
Syncerus neumanni, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality Chagwe, Uganda.

Characterised, according to Matschie, by the bases of the horns being flattened, and their short tips diminishing rapidly in calibre and directed mainly upwards, with a very slight inward and backward direction, and the greatest span immediately below the points of the tips. This buffalo is stated to be very like *B. c. æquinoctialis*, from which it differs by the distinct backward sweep of the basal portion of the horns.

There are no specimens in the collection which can be referred to this race.

C.—Bos caffer ruahensis.

Bubalus ruahaensis, *Matschie*, *Sitzber. Ges. nat. Freunde*, 1906, p. 170, *errorim.*
Bubalus ruhahensis, *Matschie*, *in Schillings' Die Zauber des Elelescho*, p. 95, Leipsic, 1906, *errorim.*
Bos caffer ruahensis, *Lydekker*, *Game Animals of Africa*, p. 71, 1908.
Syncerus ruahaensis, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 193, 1911.
Bubalus ruahensis, *Matschie*, *in literis*, 1912.

Typical locality Ruaha Valley, German East Africa.

Allied to *B. c. neumanni*, but with the basal portion of the horns much thickened and roughened, diminishing rapidly in calibre in the terminal portion, which is relatively short, and sharply bent backwards near the base, so that the tips are behind the skull. Thickest portion of under surface of horns considerably below orbits.

No specimen in collection.

D.—Bos caffer schillingsi.

Bubalus pihillingsi, *Matschie, in Schillings' Die Zauber des Elelescho*, p. 95, 1906, *errorim.*

Bos caffer pihillingsi, *Lydekker, Game Animals of Africa*, p. 72, 1908.

Syncerus schillingsi, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 193, 1911.

Bubalus schillingsi, *Matschie, in literis*, 1912.

Typical locality an island in the Pangani River, near the Masimani Range, Usagara, German East Africa.

Horns moderately flattened at base, bent downwards and backwards in such a manner that the most prominent portion of the under surface lies in the same plane as the orbit; the long tips bent so strongly inwards and outwards, but not backwards, that they form a right angle; in the middle of the length of the horn the tip suddenly diminishes in width.

Type in collection of Mr. E. C. Schillings.

No example in the Museum.

E.—Bos caffer wemberensis.

Bubalus wembarensis, *Matschie, in Schillings' Die Zauber des Elelescho*, p. 95, 1906, *errorim.*

Bos caffer wembaerensis, *Lydekker, Game Animals of Africa*, p. 72, 1908.

Syncerus wembarensis, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 193, 1911.

Bubalus wemberensis, *Matschie, in literis*, 1912.

Typical locality Chaya Swamp, southern part of Wembere Flats.

Characterised, according to its describer, by the horns being strongly thickened at the base and then sharply bent downwards but scarcely at all backwards; directed at first outwardly, narrowing rapidly, with the tips pointing upwards and running nearly parallel to each other, although showing a slight approximation.

The type specimen is somewhere in Africa.

No example in the collection.

F.—Bos caffer gariepensis.

Bubalus gariepensis, *Matschie, Sitzber. Ges. nat. Freunde*, 1906, p. 166.

Bos caffer gariepensis, *Lydekker, Game Animals of Africa*, p. 70, 1908.

Syncerus gariepensis, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality Ligua Valley, upper Orange (Gariep) Valley.

From the other members of this subgroup the Orange River buffalo is stated to be distinguished by the great length of the tips of the horns, which exceed one-third the total horn-length, and also by the marked thickening of the basal portion of the horns.

Type apparently in Berlin.

No example in the collection.

SUBGROUP ii.

Horns curving sharply inwards from point of maximum span towards middle line of skull.

G.—Bos caffer radcliffei.

Bubalus caffer radcliffei, *Thomas, Proc. Zool. Soc.* 1904, vol. i, p. 371; *Matschie, Sitzber. Ges. nat. Freunde*, 1906, p. 162.

Bos caffer radcliffei, *Lydekker, Game Animals of Africa*, p. 70, 1908, *The Ox and Its Kindred*, p. 235, 1912.

Syncerus caffer radcliffei, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1912.

Typical locality Burumba, Ankoli, South-West Uganda.

Horns very broad and flat in the palm, with the bases diverging considerably from each other in front, contrasting in these respects with those of *B. c. caffer*, which are very convex on the palm, with their inner edges (close to each other in old bulls) parallel. Horns of type measure 43½ inches in length and 11½ inches across palm. This buffalo forms a northern race of *B. caffer* fully as large as the typical southern race, but tending in the flatness of its horns towards the smaller *B. æquinoctialis*.

5. 4. 3. 37. Skull, with horns. Burumba, Ankoli. Type. *Presented by Lieut.-Col. C. Delmé-Radcliffe*, 1905.

5. 4. 3. 38. Skull, with horns. Burumba. *Same history.*

5. 4. 3. 39. Skull, with horns, immature. Burumba. *Same history.*

5. 4. 3. 40. Three pieces of skin. Burumba. *Same history.*

10. 12. 10. 1. Mounted head, provisionally referred to this race. Mount Kenia. A very old bull. *Presented by D. O. Roberts, Esq.*, 1910.

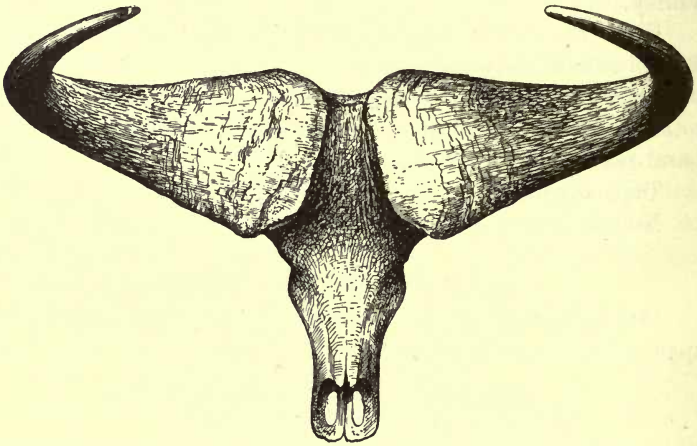


Fig. 16.—Skull and Horns of Ankoli Buffalo (*Bos caffer radcliffei*). From Thomas, *Proc. Zool. Soc.* 1904.

11. 12. 13. 1. Mounted head, of very similar type, but younger. *Presented by H. G. Barclay, Esq.*, 1911.

87. 7. 8. 6. Skull, with horns, belonging to this or a nearly allied race. British East Africa. *Presented by the Lord Delamere*, 1887.

H.—Bos caffer limpopoënsis.

Bubalus limpopoënsis, *Matschie, Sitzber. Ges. nat. Freunde*, 1906, p. 167.

Bos caffer limpopoënsis, *Lydekker, Game Animals of Africa*, p. 70, 1908.

Syncerus limpopoënsis, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality Lembobo Mountains, southern Swaziland (Gazaland).

Characterised by the absence of a backward trend in the

outer part of the horns, which (unlike those of the next two races) extend forwards considerably in advance of the plane of the greatly developed basal bosses.

7. 10. 25. 4. Skull, with horns, provisionally referred to this race. Portuguese East Africa. The tips of the horns turn backwards, so that they do not actually project in advance of the plane of the basal boss.

Presented by F. Vaughan Kirby, Esq., 1907.

I.—Bos caffer azrakensis.

Bubalus azrakensis, *Matschie*, *Sitzber. Ges. nat. Freunde*, 1906, p. 169.
Bos caffer asracensis, *Lydekker*, *Game Animals of Africa*, p. 70, 1908.
Syncerus azrakensis, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality Dar Roseires, on the Bahr-el-Azrak, Egyptian Sudan.

The horns have an inward curvature from the point of maximum span very similar to that found in the next race (*wiesei*), but the backward trend is less developed, and the tips have a distinct downward trend.

Type in the Berlin Museum.

No example in collection.

J.—Bos caffer wiesei.

Bubalus wiesei, *Matschie*, *Sitzber. Ges. nat. Freunde*, 1906, p. 168.
Bos caffer wiesei, *Lydekker*, *Game Animals of Africa*, p. 70, 1908.
Syncerus wiesei, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 193, 1911.

Typical locality Middle Zambesi Valley, between Loangwa and Revegu, or near the point of entrance of the Revabwe River.

Characterised, according to its describer, by the pronounced backward flexure of the middle portion of the horns, and the existence of a backward trend in the outer portion, although the tips are not distinctly bent downwards.

Type in Berlin Museum.

86. 5. 5. 1. Skin, mounted, provisionally referred, from its locality, to the present race. Mashonaland; shot by F. C. Selous, Esq., September 8th, 1885. *Purchased*, 1886.

86. 5. 5. 2. Skin, female, mounted. Same locality and collector. *Purchased*, 1886.

GROUP II.

Horns, as a rule relatively small and extending upwards and outwards from their bases more or less nearly in the same place, without strongly developed basal bosses. Bodily size medium or small; colour of hair generally dun, reddish, or brown in females and young males, and occasionally in adult bulls; but in some cases adults of both sexes dark.

K.—Bos caffer æquinoctialis.

Bubalus caffer æquinoctialis, *Blyth*, *Proc. Zool. Soc.* 1866, p. 371; *Pechuel-Loesche*, *Zool. Jahrb. Syst.* vol. iii, p. 713, pl. xxvii, 1888.

Bubalus pumilus orientalis, *Brooke*, *Proc. Zool. Soc.* 1873, p. 483, pl. xlii.

Bubalus æquinoctialis, *Brooke*, *Proc. Zool. Soc.* 1875, p. 457; *Pousargues*, *Ann. Sci. Nat. Zool.* ser. 7, vol. iv, p. 87, 1897; *Matschie*, *Sitzber. Ges. nat. Freunde*, 1906, pp. 161, 174.

Bos æquinoxialis, *Huet*, *Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 337, 1891.

Bubalus caffer equinoctialis, *Gray*, *Cat. Ruminants Brit. Mus.* p. 12, 1872.

Bos centralis, *Ward*, *Records of Big Game*, p. 265, 1896, nec *Gray*.

Bos caffer æquinoctialis, *Lydekker*, *Wild Oxen*, *Sheep*, *and Goats*, p. 101, 1898, *Game Animals of Africa*, p. 73, 1908; *Ward*, *Records of Big Game*, ed. 6, p. 422, 1910.

Syncerus caffer æquinoctialis, *Heller*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typified by a frontlet and horns collected by Consul Petherick in East Equatoria; the range includes a large part of the White Nile region.

This race forms to a certain degree a connecting link between the first and second groups, the bodily size being considerable, and the horns relatively large and to some extent inclining backwards in their middle portion. Tips of horns, according to Matschie, short, and less than one-third total horn-length; they taper rapidly, and are directed more inward than backward, and their axis forms an angle of about 56° with the basal portion of the horns, which is considerably thickened. General colour blackish brown, with a dark tail-tip.

74. 11. 2. 5. Mounted skin. Setit Valley, Bogosland, Abyssinia. Length of horns 21⅛ inches, maximum span 28⅝ inches. *Purchased*, 1874.

74. 11. 2. 3. Skeleton, with horns, mounted. Same locality. Horn-length 28½, maximum span 31 inches. *Same history.*

74. 11. 2. 4. Skeleton, with horns, female; skull exhibited in gallery. Same locality. *Same history.*

1. 8. 8. 47. Mounted head. Eastern Sudan. *Presented by R. McD. Hawker, Esq.*, 1901.

The following specimen appears to indicate a buffalo intermediate in some respects between *B. c. œquinoctialis* and *B. c. mathewsi*. The horns are noticeable for the great width of their basal portion and the shortness of the tips. The hair is black.

13. 1. 13. 1. Skull, with horns, and scalp. Wandi (Wando), Lado Enclave. Length of horns along outer curve 27½ inches, palm-breadth 9½ inches, tip-to-tip 27¾ inches. *Presented by G. W. Grabham, Esq.*, 1913.

L.—Bos caffer mathewsi.

Bos caffer mathewsi, *Lydekker*, *Proc. Zool. Soc.* 1904, vol. ii, p. 163, *Game Animals of Africa*, p. 72, 1908.

Bubalus mathewsi, *Matschie*, *Sitzber. Ges. nat. Freunde*, 1906, p. 174.

Syncerus caffer mathewsi, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality Mfumbiro or Ufumbiro district, Ruanda, north-east of Lake Kivu, between Tanganyika and the Albert-Edward Nyanza.

Horns smaller than in the last, and with little backward inclination of the central portion; tips inclining backwards and inwards, and their long axis forming an angle of about 35° with that of the basal portion. General colour blackish, with a white tail-tip.

4. 5. 19. 1. Skull, with horns. Mfumbiro district, Ruanda, north-east of Lake Kivu. Type (fig. 17). *Presented by A. Mathews, Esq.*, 1904.

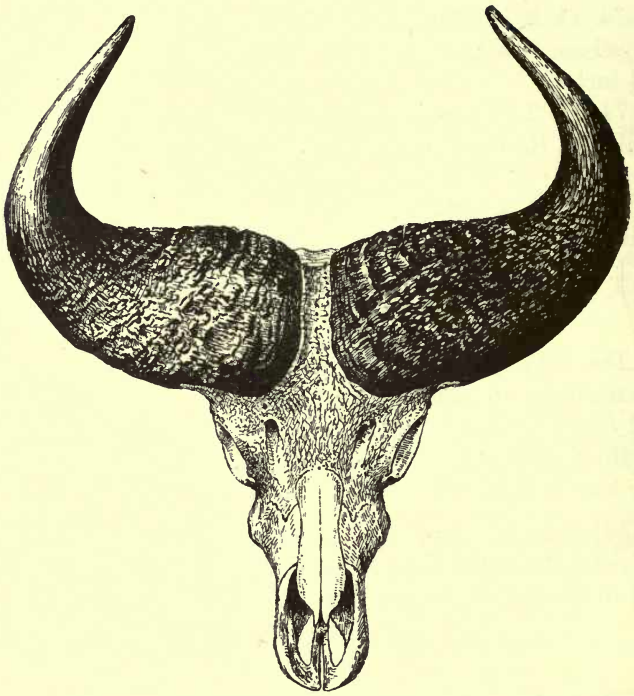


FIG. 17.—SKULL AND HORNS OF KIVU BUFFALO (*Bos caffer mathewsi*).
From Thomas, *Proc. Zool. Soc.* 1904.

M.—Bos caffer cottoni.

Bos caffer cottoni, *Lydekker*, *Field*, vol. cix, p. 87, 1907, *Proc. Zool. Soc.* 1906, p. 996 (1907), *Game Animals of Africa*, p. 73, 1908, *Proc. Zool. Soc.* 1910, p. 996, 1913, p. 236, *The Ox and Its Kindred*, p. 239, 1912.

Syncerus caffer cottoni, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality Semliki Forest; perhaps ranging to French Congo.

A relatively large race, with a distinct backward deflection of the basal part of the horns in adult bulls. General colour of adult bulls deep red, darkening, at least in some individuals, into brown; mane and lower part of legs black or blackish. Cows apparently duller red, with a distinct black mane and dark shanks.

9. 9. 16. 1. Mounted head and body-skin, female, pro-

visionally referred to this race (see *Proc. Zool. Soc.*, 1913, p. 236). Interior of French Congo; shot by Prince Paul Demidoff. The general colour is foxy red, with dark brown shanks, and a jet black mane, and a few black hairs at the tail. The head indicates a bigger animal than the cow of *B. c. hunti*, and the black mane distinguishes the specimen from all the other red buffaloes in the collection.

Presented by Prince E. Demidoff, 1909.

N.—Bos caffer thierryi.

Bubalus thierryi, *Matschie, Sitzber. Ges. nat. Freunde*, 1906, p. 172.
Bos caffer thierryi, *Lydekker, Game Animals of Africa*, p. 72, 1908, *Proc. Zool. Soc.* 1910, p. 992.
Syncerus thierryi, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 193, 1911.

Typical locality Togoland, W. Africa; also recorded from Upper Shari Valley, French Congo.

Long axes of smooth tips and rough basal portion of horns forming about a right angle with one another; the long tips tapering rapidly, and having approximately the same direction as the free basal edges of the horns; their summits separated by an interval exceeding one-third the maximum span.

Type apparently in Berlin.

10. 5. 16. 1. Frontlet and horns. Upper Shari Valley. In the fact that they are situated throughout their length almost in one plane, coupled with the great length of the slender, cylindrical tips, which exceeds that of the basal portion, and the right angle formed by the junction of these two portions with one another, the horns accord with the pair from the interior of Togoland, described and figured by Dr. Matschie under the name of *Bubalus thierryi*. The Shari horns are, however, deeper in the antero-posterior direction at their bases, where they are more expanded and flattened, and also more closely approximated in the middle line than in the type of *thierryi*. The latter, is, however, a female, and this being so, there seems no reason why the Shari horns should not pertain to the same race. Accordingly, despite the long interval between the localities where the two specimens were obtained, there seems no possibility of

separating the Shari horns from *thierryi*, and they are referred provisionally to that race.

Presented by Dr. H. K. W. Kumm, 1910.

O.—Bos caffer mayi.

Bubalus mayi, *Matschie Sitzber. Ges. nat. Freunde*, 1906, p. 172.
Bos caffer mayi, *Lydekker, Game Animals of Africa*, p. 72, 1908.
Syncerus mayi, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality Bengo, Loanda.

In this race the horns, which are approximated at the tips, have a decided upward direction recalling in some degree those of the Philippine *Bos mindorensis;* their tips tapering gradually and slightly, and their length not exceeding one-third of the total horn-length. Colour apparently undescribed.

Type seemingly a drawing in the Royal Library, Berlin.

No example in the collection.

P.—Bos caffer brachyceros.

Bubalus brachyceros, *Gray, Mag. Nat. Hist.* vol. i, p. 587, 1837, *List Mamm. Brit. Mus.* p. 153, 1843, *Cat. Ungulata Brit. Mus.* p. 24, 1852, *Cat. Ruminants Brit. Mus.* p. 10, 1872, *Hand-List Ruminants Brit. Mus.* p. 81, 1873, *Ann. Mag. Nat. Hist.* ser. 4, vol. xii, p. 499, 1873, xiii, p. 258, 1874; *Blyth, Proc. Zool. Soc.* 1863, p. 157; *Matschie, Sitzber. Ges. nat. Freunde*, 1906, pp. 161, 174.

Bos brachyceros, *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 153, 1846.

Bubalus brachycerus, *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 227, 1862.

Bubalus pumilus, *Brooke, Proc. Zool. Soc.* 1873, p. 482, 1875, p. 455.

Bos caffer brachyceros, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 112, 1898, *Game Animals of Africa*, p. 72, 1908, *The Ox and Its Kindred*, p. 243, 1912, *Proc. Zool. Soc.* 1913, p. 240; *Alexander, From the Niger to the Congo*, vol. ii, p. 394, 1907; *Ward, Records of Big Game*, ed. 6, p. 424, 1910.

Syncerus brachyceros, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality Lake Chad district.

The following tentative key (*Proc. Zool. Soc.*, 1913, p. 241) to the named races of West African dwarf buffaloes in

which the colour of the hair is known may be conveniently introduced here:—

A. Both sexes dark; horns regularly curved in a subcircular manner.
Size medium ..... *B. c. simpsoni.*

B. Adult bulls dark, young bulls and cows red or tawny; horns more expanded laterally.
a. Throat of bulls orange tawny.
a'. Size large; throat of cows orange.... *B. c. planiceros.*
b'. Size smaller; throat of cows coloured like neck; horns mainly in one plane; ear-fringe of cows partly orange (some old bulls red)..... *B. c. hunti.*
b. Apparently no orange on throat.
Size medium; horns strongly bent backwards; ear-fringe of cows mainly black ..... *B. c. brachyceros.*

C. Adults of both sexes rufous or tawny; horns more or less ungulated and flattened.
a. Size small; horns strongly ungulated; heavy ear-fringes; apparently a dark dorsal stripe..... *B. c. nanus.*
b. Size apparently larger; horns less strongly ungulated; less abundant ear-fringes; no dark dorsal stripe..... *B. c. beddingtoni.*

In the present race the horns, so far as can be determined, are of the general type of those of *planiceros*, but with the tips inclined more backwards and inwards, so that the interval between them is less. Old bulls apparently black, younger ones, like cows at all ages, rufous or tawny, with black "points." Apparently no orange on throat.

605, *a*. Skull, with horns, female. Lake Chad district. Co-type. Figured in *Wild Oxen, Sheep, and Goats*, p. 114, as a male, but identified as a fully adult female in *Proc. Zool. Soc.*, 1913, p. 240. Length of horns 17 inches, tip-to-tip interval $6\frac{3}{4}$ inches. *Presented by Capt. H. Clapperton, R.N., and Col. D. Denham, about* 1825.

605, *b*. Skull, with horns, female. Lake Chad district. Co-type. *Same history.*

4. 7. 9. 13. Frontlet and horns of an aged bull. Northern Nigeria, east of Kontago. Length of horn 17 inches, tip-to-tip interval 20 inches, palm width 6 inches. *Presented by Capt. H. Cock*, 1904.

7. 7. 8. 254. Skull, with horns, of a younger bull

provisionally referred to this race. Shot during the Alexander-Gosling expedition by Capt. Gosling on an island in the Ubangui. Length of horns 25½ inches, tip-to-tip interval 10½ inches, palm-width 6¾ inches. Alexander gave the tip-to-tip interval at 11¾ inches. The colour of the skin

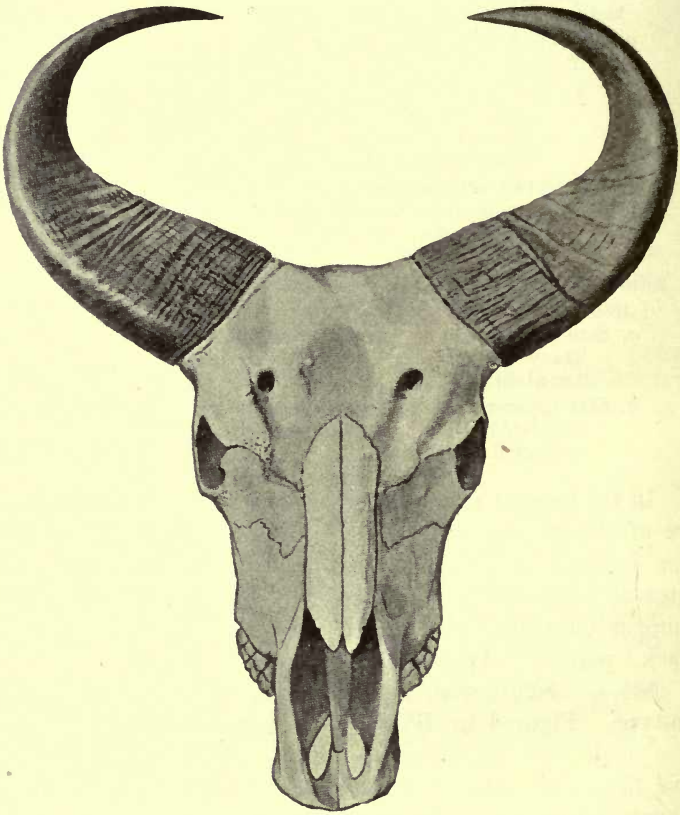


Fig. 18.—Skull and Horns of Female Lake Chad Buffalo (*Bos caffer brachyceros*).
From *Wild Oxen, Sheep, and Goats.*

of this bull was dull tawny, with black face, mane, ear-fringes and legs; one cow shot at the same time was similarly coloured, but a second cow was a richer tawny, with the forehead red. The Ubangui River forms the division between French and Belgian Congo.

Presented by Boyd Alexander, Esq., 1907.

The following specimens indicate allied buffaloes, one of which was of larger size than *B. c. brachyceros*:—

55. 5. 20. 4. Skull, without lower jaw or horns. Niger Valley. *Presented by Dr. W. B. Baikie*, 1855.

7. 7. 8. 252. Skull, with horns. Locality unknown; obtained during Alexander-Gosling expedition. Horn-length 29 inches, tip-to-tip interval 30½ inches, palm-width 8 inches. *Presented by the Alexander-Gosling Expedition*, 1907.

7. 7. 8. 254, *a*. Skull, with horns, of an immature bull agreeing approximately in size with the last. Locality unknown. *Same history.*

72. 11. 11. 1. Skull, with horns, belonging to this or one of the allied species. Locality unknown; collected by E. Blyth, Esq. *Purchased*, 1872.

The following immature skulls are referable to various members of the *nanus—planifrons—brachyceros—simpsoni* group:—

4. 7. 27. 1. Immature skull, with horns. South Nigeria. *Presented by E. D. Simpson, Esq.*, 1904.

91. 3. 26. 1. Skull, with horns, of about same age as last. Sette-Kama, French Congo. *Purchased*, 1891.

91. 3. 26. 2–3. Two younger skulls, with horns. Sette-Kama. *Same history.*

5. 11. 27. 16. Immature skull of approximately the same age as the last, with one horn. French Congo; collected by G. L. Bates, Esq. *Purchased*, 1905.

55. 5. 20. 6–7. Two immature skulls, with horns. Niger Valley. *Presented by Dr. W. B. Baikie*, 1855.

10. 6. 1. 45–46. Two immature skulls, with horns. Oban, Southern Nigeria; collected by P. A. Talbot, Esq. *Purchased*, 1910.

10. 1. 19. 1. Immature skull, with horns. Kasai Valley, Congo Free State. *Presented by W. M. Hilton-Simpson, Esq.*, 1910.

Q.—Bos caffer planiceros.

Bubalus planiceros, *Blyth, Proc. Zool. Soc.* 1863, p. 157; *Renshaw ibid.* 1904, ii, p. 130; *Matschie, Sitzber. Ges. nat. Freunde*, 1906, pp. 161, 174.

Bubalus centralis, *Gray, Cat. Ruminants Brit. Mus.* p. 11, 1872 *Hand-List Ruminants Brit. Mus.* p. 11, 1873; *Matschie, Säugethiere Togogebietes*, p. 19, 1893, *Sitzber. Ges. nat. Freunde*, 1906, p. 162; *Pousargues, Ann. Sci. Nat. Zool.* ser. 7, vol. iv, p. 87, 1897.

Bos caffer planiceros, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 103, 1898, *Game Animals of Africa*, p. 73, 1908, *The Ox and Its Kindred*, p. 241, 1912, *Proc. Zool. Soc.* 1913, p. 235; *Ward, Records of Big Game*, ed. 6, p. 424, 1910.

Bos pumilus, *Brehm, Tierleben*, ed. 3, *Säugeth.* vol. iii, p. 320, fig. 1891, nec *Turton.*

Syncerus planiceros, *Hollister, Proc. Biol. Soc. Washington*, vol. xxiv, p. 193, 1911.

Syncerus centralis, *Hollister, loc. cit.*

Typical locality probably Gambia, see *Proc. Zool. Soc.*, 1913, p. 240; from Gambia the range extends into Sierra Leone.

Adult bulls dark, younger bulls and cows red or tawny; an orange tawny band on the throat of both sexes, and a similarly coloured patch below the ear. Horns curving regularly, with a considerable lateral expansion.

91. 1. 8. 1. Frontlet and horns of old bull. Probably from Gambia. Type. The tips of the horns are so worn down that they are quite blunt and rounded, while the rugosities on the palm are much abraded.

Exchanged with King's College, London, 1891.

65. 3. 30. 1. Skull of a younger bull, wanting the lower jaw, with the right horn. Type of *B. centralis.* West Africa; collected by Dalton (not, as stated by Gray in his Hand-List, 1873, Dr. Baikie). Matschie, *Sitzber. Ges. nat. Freunde*, 1906, p. 162, incorrectly states that *B. centralis* was based on an Atbara buffalo. *Purchased*, 1865.

11. 2. 16. 1. Mounted head. Upper Gambia. The horns agree very closely with those of the preceding specimen. *Presented by G. Fenwick Owen, Esq.*, 1901.

11. 6. 10. 112. Skull, with horns, and skin. Upper Gambia. The general colour is dark chocolate-brown, with the fetlocks and tail-tip black. *Same history.*

11. 6. 10. 115. Skull, with horns, and skin. Upper Gambia. *Same history.*

46. 10. 16. 1. Skeleton, female. Gambia; collected by Whitfield. Skull exhibited.

Presented by the Earl of Derby, 1846.

R.—Bos caffer hunti.

Bos (Bubalus) caffer hunti, *Lydekker*, *Proc. Zool. Soc.* 1913, p. 240.

Typical locality Southern Nigeria.

Size smaller than in preceding race, with which this agrees in general colour, but with no orange-tawny band on throat

Fig. 19.—Head of S. Nigerian Buffalo (*Bos caffer hunti*). *Proc. Zool. Soc.* 1913.

of cows, and that in bulls narrower. Male horns differ from those of *planiceros* by the front surface sloping regularly backwards nearly in one plane, instead of curving at first backwards, then forwards, and finally backwards. Some old retain the immature red colour.

The following are the dimensions, in inches, of the horns of bulls of Gambian and South Nigerian races, together with those of the Alexander-Gosling skull from the Ubangui referred to the Lake Chad race:—

	Lake Chad. No. 4. 7. 9. 13.	Gambian. No. 7. 7. 8. 254.	S. Nigerian. Head described in P. Z. S. 1913.
Outside length	25¼	27¼	20½
Palm breadth	6¾	7½	7½
Tip-to-tip interval	11¼	21½	12

12. 11. 16. 1. Mounted head of female. Southern Nigeria. Type; figured by the writer, *loc. cit.* The following are the measurements of the horns in the larger of the two type specimens of *B. c. brachyceros* and the present specimen:—

	Lake Chad.	S. Nigerian.
Outside length	17½	12
Palm breadth	4	3¾
Tip-to-tip interval	7	9½

Presented by Lieut. A. W. Hunt, R.N., 1912.

98. 5. 24. 1. Mounted skin of immature female. Lokoja, at the junction of the Benue River with the Niger. There is no black mane on the neck. *Purchased*, 1898.

98. 5. 24. 1, *a*. Skull, without lower jaw, of the preceding specimen. *Same history*

10. 6. 1. 46. Skin. Gamoning Valley, Oban, Southern Nigeria. The general colour is rufous, with the lower part of the legs blackish; there is no black mane.

Presented by P. A. Talbot, Esq., 1910.

S.—Bos caffer nanus.

Bos nanus, *Boddaert, Elenchus Anim.* p. 152, 1785; *Ward, Records of Big Game*, p. 275, 1896.

Bos pumilus, *Kerr, Anim. Kingdom*, p. 340, 1792; *Turton, Transl. Linn. Syst. Nat.* vol. i, p. 121, 1806; *Huet, Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 343, 1891, *in part; Flower and Lydekker, Study of Mammals*, p. 361, 1891; *Brehm, Tierleben*, ed. 3, *Säugeth.* vol. iii, p. 321, fig. 1891.

Bos brachyceros, *Pel, Bijdr. tot Dierkunde*, p. 33, 1854, nec *Sundevall.*

Bos brachicheros, *Du Chaillu, Explor. Equat. Africa*, p. 210, 1861.

Bubalus reclinis, *Blyth, Proc. Zool. Soc.* 1873, p. 158; *Gray, Cat. Ruminants Brit. Mus.* p. 12, 1872, *Hand-List Ruminants Brit. Mus.* p. 82, 1873.

Bubalus pumilus, *Brooke*, *Proc. Zool. Soc.* 1873, p. 482, pl. liv, 1875, p. 485, *Ann. Mag. Nat. Hist.* ser. 4, vol. xiii, p. 159, 1874; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 230, 1884; *Pechuel-Loesche*, *Zool. Jahrb. Syst.* vol. iii, p. 711, pl. xxviii, figs. 3, 4, 1888; *Pousargues*, *Ann. Sci. Nat. Zool.* ser. 7, vol. iv, p. 83, 1897.

Bubalus pumilus occidentalis, *Brooke*, *Proc. Zool. Soc.* 1873, p. 483.

Bubalus brachyceros, *Bocage*, *J. Sci. Lisboa*, ser. 2, vol. i, p. 25, 1890; *Matschie*, *Säugethiere Togogebietes*, p. 19, 1893, nec *Gray*.

Bos caffer nanus, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 106, 1898, *Game Animals of Africa*, p. 72, 1908, *The Ox and Its Kindred*, p. 237, 1912, *Proc. Zool. Soc.* 1913, p. 240; *Ward*, *Records of Big Game*, ed. 6, p. 424, 1910.

Bubalus nanus, *Matschie Sitzber. Ges. nat. Freunde*, 1896, p. 164.

Syncerus nanus, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxiv, p. 192, 1911.

Typical locality probably the Congo.

Both sexes rufous at all ages, apparently with a dark dorsal stripe; ears heavily fringed with orange hairs; axis

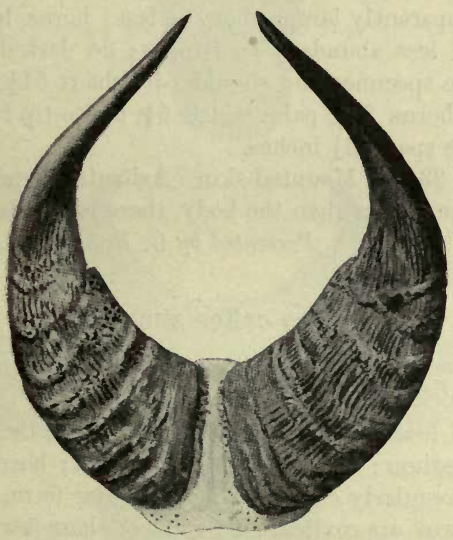


FIG. 20.—FRONTLET AND HORNS OF CONGO BUFFALO (*Bos caffer nanus*).
From *Wild Oxen, Sheep, and Goats.*

of points of horns forming a right angle with that of the basal portion—which is much flattened—so that the tip-to-tip interval is very small. Bodily size small.

606, *a*. Frontlet and horns (fig. 20). Type; locality unknown, but probably from some part of Congo territory. Described in 1686 by Grew, *Rarities of Gresham College;* and again described, with a figure, by Pennant in 1781. In 1785 Boddaert gave it the name *Bos nanus*, in 1792 it was renamed *B. pumilus* by Kerr, and in 1863 it received from Blyth the title *B. reclinis*. In his *Catalogue* of 1852 Gray figured it as the young of the Cape buffalo. The name *pumilus* was revived by Sir V. Brooke in 1873, and again in 1875, with *planiceros* and *brachyceros* as synonyms.

Presented by the Council of the Royal Society.

T.—Bos caffer beddingtoni.

Bos (Bubalus) caffer beddingtoni, *Lydekker*, *Proc. Zool. Soc.* 1913, p. 240.

Typical locality Ashanti.

Size apparently larger than in last; horns less strongly angulated; less abundant ear-fringes; no dark dorsal stripe. In the type specimen the shoulder-height is 51½, the outside length of horns 20½, palm-width 6¼, tip-to-tip interval 13½, and outside span 23¼ inches.

99. 10. 23. 4. Mounted skin. Ashanti. Type. Although the legs are darker than the body, there is no black mane on the neck. *Presented by C. Beddington, Esq.*, 1899.

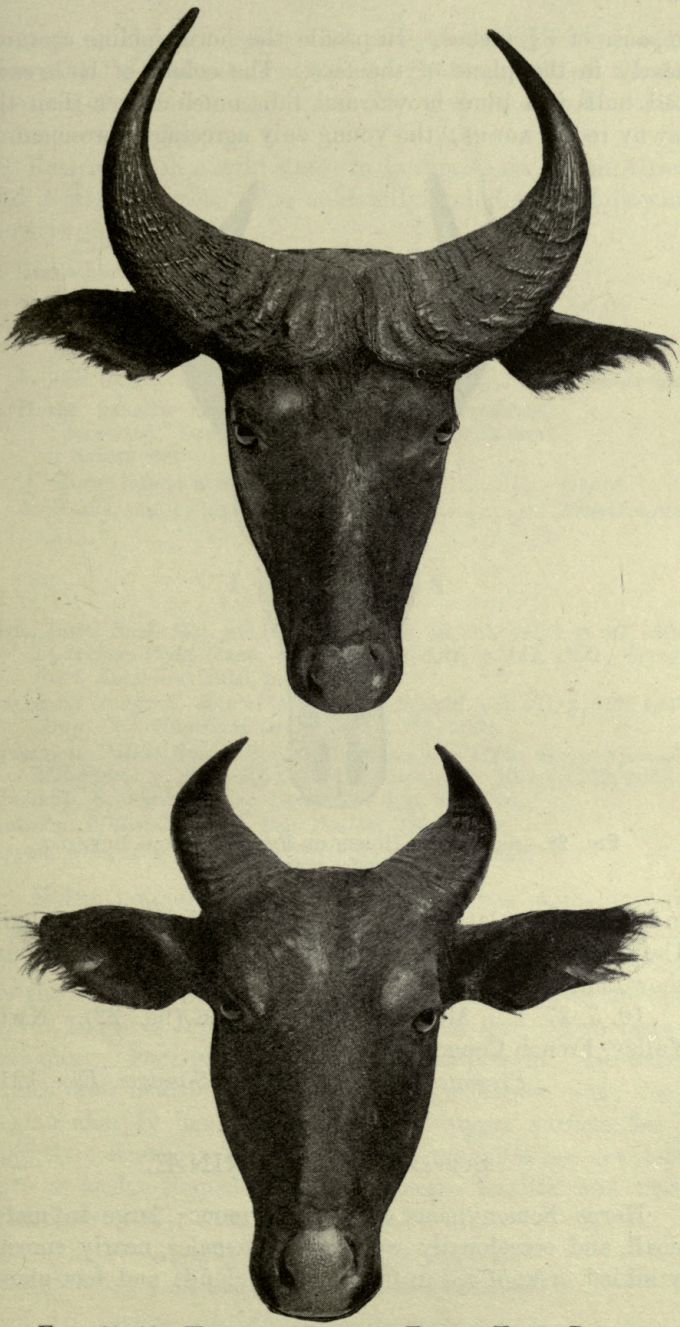
U.—Bos caffer simpsoni.

Bos caffer simpsoni, *Lydekker*, *Proc. Zool. Soc.* 1910, p. 993, *The Ox and Its Kindred*, p. 240, 1912.

Typical locality left bank of Kwilu River, Belgian Congo.

Size medium; both sexes dark coloured; horns relatively small and regularly curved in a subcircular form.

The horns approximate in general character to those of *nanus* and exceed any recorded for the latter, the right horn in a bull (fig. 21) measuring 25⅜ inches along the outer curve and the left one 24½ inches; the basal girth of the former being 16½ inches, its maximum width 6⅜ inches, and the expanse from tip to tip 13½ inches. In a cow the left horn measured 15 inches in length, with a girth of 9½ and an



FIGS. 21, 22.—HEADS OF MALE AND FEMALE KWILU BUFFALO (*Bos caffer simpsoni*).
Proc. Zool. Soc. 1910.

expanse of $8\frac{3}{4}$ inches. In profile the horns incline upwards nearly in the plane of the face. The colour of both cows and bulls is a pure brown, and thus much darker than the tawny red of *nanus;* the young only agreeing approximately

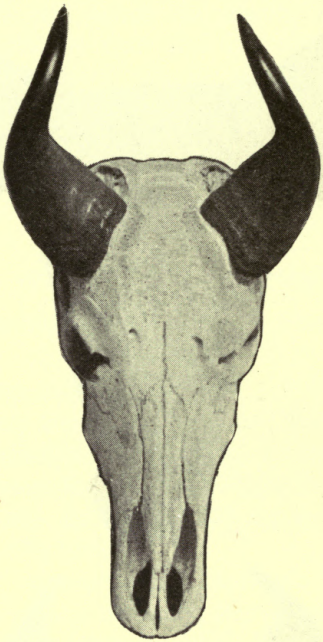


FIG. 23.—SKULL AND HORNS OF FEMALE KWILU BUFFALO (*Bos caffer simpsoni*).

in hue with the latter, and cows being fully as dark as bulls. The fringes of the ears are usually tinged with tawny and show one white lock.

10. 5. 27. 1. Mounted head, female (fig. 22). Kwilu Valley, French Congo. Type.

Presented by W. M. Hilton-Simpson, Esq., 1910.

SUBFAMILY ii.—CAPRINÆ.

Horns homonymous or heteronymous; large in males, small, and occasionally wanting, in females, nearly smooth, wrinkled, or knobbed in front. Face-glands and foot-glands

present or absent; upper molars hypsodont, with narrow crowns and no distinct inner accessory column. Teats usually two. Muzzle hairy and vertically grooved. Tail usually short, never tufted.

Restricted (in a wild state) to Europe, Asia, North Africa, and North America. The subfamily includes the following generic groups:—

A. Horns homonymous; males inodorous; teats 2.
  a. Tail short.
    a'. Face- and foot-glands present ..... *Ovis*.
    b'. Face-glands absent, foot-glands rudimentary *Pseudoïs*.
  b. Tail longer; face- and foot-glands wanting ..... *Ammotragus*.

B. Horns usually heteronymous,* if homonymous, "perverted"; males odorous; no glands on face or in fore-feet.
  a. Horns large; a beard; teats 2 ..... *Capra*.
  b. Horns small; no beard; teats 4 or 2 ..... *Hemitragus*.

I. Genus OVIS.

Ovis, *Linn. Syst. Nat.* ed. 10, p. 70, 1758, ed. 12, vol. i, p. 97, 1766; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 149, 1898; *Pocock, Proc. Zool. Soc.* 1910, p. 859.

Caprovis, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xvi, p. 702, 1847; *Gray, Cat. Ungulata Brit. Mus.* p. 171, 1852.

Musimon, *Pallas, Spicil. Zool.* vol. ii, fasc. 2, p. 1786; *Gray, Knowsley Menagerie*, p. 36, 1850, *Cat. Ungulata Brit. Mus.* p. 172, 1852.

Musmon, *Schrank, Fauna Boica*, vol. i, p. 81, 1798.

Ammon, *Blainville, Bull. Soc. Philom.* 1816, p. 76.

Argali, *Gray, Cat. Ungulata Brit. Mus.* p. 174, 1852.

Horns homonymous, in some instances with terminal "perversion," in wild species usually heavily wrinkled, and, except when "perversion" is developed, curling forwards by the sides of the face, or extending outwards in an open spiral, those of females small and spear-like. Two teats†; tail short. Face-glands and foot-glands present. No beard; males not malodorous. Skull wedge-shaped, with facial region sharply bent downwards, and upper surface flat or slightly concave; a lachrymal pit; premaxilla not developed into a wedge-shaped process between maxilla and nasal. Vertebræ: C. 7, D. 13, L. 6, S. 4, Ca. 7.

* Not in most domesticated breeds.
† An extra pair occasionally developed.

Distribution approximately co-extensive with that of subfamily, except that it does not include North Africa, Arabia, or Peninsular India. "Holarctic region from Cyprus and Asia Minor eastward across central and northern Asia, and in western North America from Alaska to northern Mexico; one species isolated in the Mediterranean portion of Europe."—(*Miller.*)

The following is a tentative "key" to the six species of the genus here recognised:—

A. Horns "perverted"; females hornless.
Size small or medium; colour rufous, with a light saddle-patch, at least in winter; tail black at tip ..... *O. orientalis.*

B. Horns generally normal, but sometimes "perverted"; females horned or hornless.
Size small (27 in.); colour dark, with a light saddle-patch in adult rams in winter; upper side of tail black ..... *O. musimon.*

C. Horns normal (*i.e.* without "perversion").
a. Horns strongly wrinkled, with varying development of front outer angle; face-gland and lachrymal pit large.
a'. Size medium (32 to 36 in. at shoulder), a long-haired and generally partially or wholly black throat-ruff, typically composed of two lobes at base; no nuchal or dorsal crest; tail short (4 in.); tips of horns turning mainly inwards.
a''. Colour greyish or brownish fawn ..... *O. vignei.*
b''. Colour darker, with a double light saddle-patch ..... *O. laristanica.*
b'. Size typically very large (46 to 48 in.) at shoulder); throat-ruff, when present, wholly white, yellowish, or greyish; generally a dark nuchal, and sometimes a dorsal, crest; tail very short (3 in.); tips of horns markedly everted ..... *O. ammon.*
b. Horns nearly smooth (apart from lines of growth), with front outer angles strongly pronounced; face-gland and lachrymal pit small.
Size large (39 to 40 in.); colour ranging from black to white, with a large white rump-patch in dark forms ..... *O. canadensis.*

I. OVIS ARIES.

Ovis aries, *Linn.*, *Syst. Nat.* ed. 10, vol. i, p. 70, 1758, ed. 12, vol. i, p. 97, 1766; *Lydekker*, *The Sheep and Its Cousins*, pp. 1, 47, 1912.

The type of the genus, and not definitely known in a wild state, although it is most probable that the mouflon (*O. musimon*) is one of the ancestral forms. If this were proved to be the case, that animal should be known as *Ovis aries musimon*.

II. OVIS MUSIMON.

Ovis musimon, *Schreber* (*ex Pallas*), *Säugthiere*, vol. v, pl. cclviii, 1782; *Wagner*, *Suppl. to do.* vol. iv, p. 242, 1844; *Gray*, *Knowsley Menagerie*, p. 36, 1850; *Blasius*, *Säugeth. Deutschlands*, p. 471, 1857; *Cornalia*, *Fauna Ital.—Mamm.* p. 56, 1870; *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 153, 1873; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 243, 1884; *Flower and Lydekker*, *Study of Mammals*, p. 356, 1891; *Brehm*, *Tierleben*, ed. 3, *Säugeth.* vol. iii, p. 220, 1891; *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 154, 1898, *Great and Small Game of Europe, etc.* p. 132, 1901, *The Sheep and Its Cousins*, p. 46, 1912; *Ward*, *Records of Big Game*, ed. 6, p. 414, 1910; *Pocock*, *Proc. Zool. Soc.* 1910, p. 857; *Tesdorpf*, *Einbürgerung des Muffelwildes* (*Moufloñs*) *auf dem europäischen Festlande*, *Neudamm*, 1910, p. 9; *Trouessart*, *Faune Mamm. Europe*, p. 242, 1910; *Nasonov*, *Bull. Ac. Sci. St. Pètersb.* 1911, p. 1292; *Miller*, *Cat. Mamm. W. Europe Brit. Mus.* p. 987, 1912; *Satunin*, *Mitt. Kaukas. Mus.* vol. vii, p. 78, 1912.

Ægoceros musimon, *Pallas*, *Zoogr. Rosso.-Asiat.* vol. i, p. 230, 1811.

Ovis musmon, *H. Smith*, *Griffith's Animal Kingdom*, vol. iv, p. 322, v, p. 360, 1827; *Jardine*, *Nat. Libr.-Mamm.* vol. iv, p. 132, 1836; *Bonaparte*, *Iconogr. Fauna Ital.-Indice distrib.* 1841.

Capra musmon, *Fischer*, *Synop. Mamm.* p. 488, 1829.

Ovis musimon *var.* occidentalis, *Brandt and Ratzeburg*, *Med. Zool.* vol. i, p. 55, 1829.

Caprovis musimon, *Hodgson*, *Journ. Asiat. Soc. Bengal*, vol. xvi, p. 702, 1847; *Gray*, *Cat. Ungulata Brit. Mus.* p. 173, 1852, *Cat. Ruminants Brit. Mus.* p. 56, 1872, *Hand-List Ruminants Brit. Mus.* p. 132, 1873.

Musimon musmon, *Gervais*, *Hist. Nat. Mamm.* vol. ii, p. 191, 1855; *Graells*, *Mem. Ac. Madrid*, vol. xvii, p. 369, 1897.

Musimon musimon, *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 85, 1873.

(?) Ovis matschiei, *Duerst*, *in Wilckens' Grundzüge Naturgesch. Haustiere*, ed. 2, pp. 177 and 180, Leipsic, 1905.

Typical locality Sardinia; the name *O. m. occidentalis* is available for the Corsican race.

Size small; shoulder-height about 27 inches. Horns generally, or frequently, curving forwards in "ammon" fashion by the sides of the face, but in some instances "perverted"; females either horned or polled. General colour of upper-parts reddish or blackish brown, darker in winter than in summer; a blackish median streak on neck and shoulder, extending as a blackish shade behind the latter; a conspicuous greyish white saddle-patch in adult rams in winter. Under-parts and inner sides of limbs dull

FIG. 24.—HEAD OF SARDINIAN MOUFLON (*Ovis musimon*).
From a photograph lent by the New York Zoological Society.

whitish; a black area on lower surface of neck, continued down upper part of leg and as a narrow stripe on part of shank nearly to hoofs; dark area of upper-parts divided from white of belly by dark flank-band; tail black above, whitish beneath.

Horns are known to occur in some Corsican ewes, while hornless ewes are common in Sardinia, but whether this is a constant difference remains to be proved. The statement that Sardinian rams have normal and Corsican rams "perverted" horns is not borne out by the facts.

Duerst recognises two kinds of mouflon living side by side, alike in Sardinia and Corsica, viz.: *O. musimon:* foxy

red with a brown stripe on back, white spots on heads and flanks; horns light-coloured, curved in a single plane. *O. matschiei:* more brownish grey in general colour, face ash-grey rarely marked with white; horns dark brown, curved in a spiral with tips directly outwards.

53. 8. 29. 49. Skin, mounted. Sardinia (?).
Presented by the Zoological Society, 1853.

95. 4. 4. 1. Skin, mounted. Genargentu Range, Central Sardinia. *Presented by Ford G. Barclay, Esq.*, 1895.

5. 3. 6. 3. Skin, mounted. Sardinia.
Presented by J. Rowland Ward, Esq., 1905.

61. 3. 24. 2. Skin, female. (?) Bred in London.
Presented by the Zoological Society, 1861.

62. 12. 22. 2. Skin, female. (?) Bred in London.
Same donor, 1862.

60. 4. 23. 1. Skeleton. (?) Bred in London.
Same donor, 1860.

55. 12. 26. 162. Skull, with horns. Sardinia; collected by W. Ewer, Esq. *Same donor*, 1855.

95. 4. 16. 6, *a*. Skull, with horns. Genargentu Range, Sardinia. *Presented by E. N. Buxton, Esq.*, 1895.

95. 4. 16. 6–7. Two skins, one associated with the preceding specimen. Genargentu Range. *Same history.*

9. 1. 11. 1. Frontlet and horns. Corsica; collected by Dr. C. I. Forsyth Major. The curvature of the horns is normal, without terminal "perversion." *Purchased*, 1908.

5. 3. 6. 2. Skin, young. Sardinia.
Presented by A. Bayley-Worthington, Esq., 1905.

III. OVIS ORIENTALIS.

Ovis musimon *var.* orientalis, *Brandt and Ratzeburg, Med. Zool.* vol. i, p. 54, 1829.

Ovis gmelini, *Blyth, Proc. Zool. Soc.* 1840, p. 69; *Brooke, ibid.* 1875, p. 526; *Blanford, Eastern Persia*, vol. ii, p. 88, 1876; *Danford and Alston, Proc. Zool. Soc.* 1877, p. 276, 1880, p. 55; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 139, 1891; *Ward, Records of Big Game*, p. 258, 1896; *Satunin, Zool. Jahrb. Syst.* vol. ix, p. 312, 1896; *Matschie, Sitzber. Ges. nat. Freunde*, 1896, p. 97; *Radde, Museum Caucasicum*, vol. i, p. 111, 1899; *Dinnik, Zap. Kavk. otd. Russ. Geogr. Obšč.* vol. xxvii, pt. 1, p. 158, 1910.

Ovis orientalis, *Keyserling and Blasius, Wirbelthiere Europ.* p. 29, 1840; *Wagner, Schreber's Säugthiere, Suppl.* vol. iv, p. 507, 1844; *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 153, 1873; *Nehring, Zool. Garten*, vol. xxviii, p. 378, 1887; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 159, 1898, *Large and Small Game of Europe, etc.* p. 135, 1901, *Ann. Mag. Nat. Hist.* ser. 7, vol. xx, p. 122, 1907, *The Sheep and Its Cousins*, p. 253, 1912; *Ward, Records of Big Game*, ed. 6, p. 412, 1910; *Nasonov, Bull. Ac. Sci. St. Pétersb.* 1910, p. 681, 1911, p. 1270.

Ovis (Musimon) orientalis, *Gray, Knowsley Menagerie*, p. 36, 1850.

Caprovis (Musimon) orientalis, *Gray, Cat. Ungulata Brit. Mus.* p. 172, 1852, *Cat. Ruminants Brit. Mus.* p. 56, 1872; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 251, 1862.

Caprovis orientalis, *Gray, Hand-List Ruminants Brit. Mus.* p. 131, 1873.

Red Sheep.

Typical locality Troödos Mountains, Cyprus; the range extending through Asia Minor and Transcaucasia to Persia.

Typically a small sheep (26½ inches at withers), but attaining larger dimensions (33 inches) on the Asiatic mainland. Horns "perverted" homonymous, typically with outer front angle bevelled off. Typically the general colour bright rufous above in summer; in winter browner, with a more or less distinct light saddle-patch; a dark flank-band separating rufous area from white of belly; no white rump-patch, and basal half of upper side of tail coloured like back, but tip black. Muzzle, chin, throat (in summer), inner side of ears, under-parts, buttocks below tail, and inner sides and shanks of legs white; throat-fringe, which may expand into a distinct ruff, a line near front of thigh, and one on front of fore-legs blackish.

There has been much confusion as to which is the typical race of this species, but it has been conclusively shown by Nasonov that the Cyprian sheep is entitled to this position.

The specimens in the collection do not suffice to form a "key" to the local races; and as Nasonov's work is in Russian the writer has been unable to avail himself of the information it contains. It may be noted that the eastern forms of the species appear to approximate—especially in the greater development of the throat-ruff—to *O. vignei.*

A.—Ovis orientalis orientalis.

Ovis ophion, *Blyth, Proc. Zool. Soc.* 1840, p. 69; *Brooke, ibid.* 1875, p. 526; *Alston and Danford, ibid.* 1880, p. 59; *Biddulph, ibid.* 1884, p. 594, pl. lxviii; *Langkavel, Zool. Garten.* vol. xxxiv, p. 183, 1891; *Ward, Records of Big Game*, p. 256, 1896; *Günther, Journ. Linn. Soc.—Zool.* vol. xxvi, p. 374, 1900.

Ovis cyprius, *Blasius, Säugeth. Deutschlands*, p. 473, 1857.

Caprovis ophion, *Gray, Cat. Ruminants Brit. Mus.* p. 56, 1872.

Musimon cyprius, *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 85, 1873.

Ovis cypria, *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 153, 1873.

Ovis orientalis ophion, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 163, 1898, *Great and Small Game of Europe, etc.* p. 137, 1901; *Ward, Records of Big Game*, ed. 6, p. 413, 1910.

Ovis orientalis orientalis, *Nasonov, Bull. Ac. Sci. St. Pétersb.* 1911, p. 1271.

Typical locality Troödos Mountains, Cyprus.

Size small (about 26½ inches at withers). General colour rufous fawn above (browner in winter), white beneath, with indistinct blackish dorsal stripe for a short distance above withers, and narrow blackish band dividing rufous from white area, which is continued down thighs near front; a more or less distinct light saddle-patch, most apparent in winter. A blackish crest down throat and chest, expanding into small ruff inferiorly. Front of fore-legs above knees blackish; dark patches inside thighs above hocks; tail-tip black; ears grey externally, white internally. Forehead, upper part of muzzle, and area in front of eyes dusky brown; nose, chin, and throat white. Outer front angle of horns completely bevelled off.

85. 3. 2. 1. Skin, mounted. Troödos Range. Figured by Col. Biddulph, *loc. cit.*

Presented by Gen. Sir R. Biddulph, G.C.B., 1885.

0. 1. 16. 1. Mounted female head. Cyprus.

Presented by Lieut.-Col. J. Marriott, 1900.

85. 6. 6. 1. Skin and horns. Troödos Range; shot by Gen. Sir R. Biddulph. *Presented by Col. J. Biddulph*, 1885.

86. 11. 31. 1–2. Two skins, with horns. Troödos Range.

Presented by Hamilton Lang, Esq., 1886.

B.—Ovis orientalis gmelini.

Ovis gmelini, *Blyth*, *Proc. Zool. Soc.* 1840, p. 69: *see also* under head of species.

Ovis orientalis typica, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 160, 1898.

Ovis orientalis gmelini, *Lydekker*, *Ann. Mag. Nat. Hist.* ser. 7, vol. xx, p. 121, 1907, *Field*, vol. cxiii, p. 242, 1909, *The Sheep and Its Cousins*, p. 256, 1912; *Nasonov*, *Bull. Ac. Sci. St. Pétersb.* 1911, p. 1272.

Typical locality Erzerum, Asia Minor.

Size larger (33 inches). Typically the horns directed mainly backwards, with outer front angle distinct. General colour of upper-parts apparently russet-yellow or foxy red, with a dark purplish mark above knees and darkish streak on chest, the dorsal region being also darker than elsewhere. In winter a light saddle-patch, and a short chestnut and black throat-ruff. Less white on chin and throat than in typical race.

The sheep from the Cilician Taurus may represent a distinct race, characterised by the larger extent and purity of the white area on the muzzle, chin, and throat in summer.

55. 12. 24. 396. Skull and skin. Erzerum; collected by Messrs. Dickson and Ross. Type.
Presented by the Zoological Society, 1853.

55. 12. 24. 395. Immature skull and skin. Erzerum; collected by Messrs. Dickson and Ross. *Same history.*

55. 12. 26. 156. Skull, with horns, of female. Erzerum; collected by Messrs. Dickson and Ross. *Same history.*

47. 9. 22. 2. Immature skull and skin. Armenia.
Presented by the Hon. R. Curzon, 1847.

0. 1. 29. 1. Mounted skin, with skull separate. Khodarendikian, Asia Minor. *Presented by C. G. K. Lee, Esq.*, 1900.

54. 1. 24. 1. Skull, with horns, provisionally referred to this race. Stated to be from an island in the Mediterranean; figured by Alston, *Proc. Zool. Soc.* 1850, pp. 56 and 57 Length of horns 40¼ inches; this being the "record" measurement. *Presented by W. Burchart Barker, Esq.*, 1854.

8. 11. 21. 2–3. Two skins. Ivuz Dagh, near Enagli, Asia Minor. *Presented by A. Buxton, Esq.*, 1908.

The following specimens may represent a distinct race:—

76. 8. 7. 3. Skeleton, mounted. Cilician Taurus, Asia Minor. *Presented by C. G. Danford, Esq.*, 1876.

76. 8. 7. 4. Skeleton, female. Cilician Taurus.
Same history.

C.—Ovis orientalis anatolica.

(?) Ovis anatolica, *Valenciennes, Compt. Rend. Ac. Sci. Paris*, vol. xliii, p. 65, 1856; *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 153, 1873; *Grevé, Zool. Gart.* 1895, p. 367; *Matschie, Sitzber. Ges. nat. Freunde*, 1896, p. 99.

Ovis orientalis anatolica, *Nasonov, Bull. Ac. Sci. St. Pétersb.* 1911, p. 1277; *Lydekker, The Sheep and Its Cousins*, p. 257, 1912.

Typical locality Anatolia.

Unrepresented by skins in collection. Horns much curved downwards.

* *. Cast of frontlet and horns. Original from Anatolia.
Presented by J. Rowland Ward, Esq., 1903.

D.—Ovis orientalis urmiana.

Ovis ophion *var.* urmiana, *Günther, Journ. Linn. Soc.—Zool.* vol. xxvii, p. 374, 1900.

Ovis ophion urmiana, *Lydekker, Great and Small Game of Europe, etc.* p. 131, 1901, *Field*, vol. cxiii, p. 242, 1909, *The Sheep and Its Cousins*, p. 257, 1912.

Ovis urmiana, *Nasonov, Bull. Ac. Sci. St. Pétersb.* 1911, p. 1281.

Typical locality Koyun Daghi Island, Lake Urmi, Western Persia.

A relatively small race, with the front outer angle of horns bevelled off, much in the same manner as in Cyprian race. In a specimen figured by Nasonov (*op. cit.* p. 1283, fig. 4) the horns are bent sharply downwards, with very little backward inclination, so that their tips project much below the plane of the upper cheek-teeth, instead of being nearly continuous with the same. Probably there is a well-developed throat-ruff in winter.

99. 9. 13. 1. Skull, with horns. Island in Lake Urmi, Persia. Type. *Presented by R. S. Günther, Esq.*, 1899.

E.—Ovis orientalis erskinei.

Ovis gmelini erskinei, *Lydekker*, *Field*, vol. civ, p. 1031, 1904.

Ovis orientalis typica, *Lydekker*, *Ann. Mag. Nat. Hist.* ser. 7, vol. xx, p. 122, 1907; *Ward*, *Records of Big Game*, ed. 6, p. 412, 1910.

Ovis urmiana erskinei, *Nasonov*, *Bull. Ac. Sci. St. Pétersb.* 1911, p. 1286.

Ovis orientalis erskinei, *Lydekker*, *The Sheep and Its Cousins*, p. 259, 1912.

Fig. 25.—Head of Elburz Red Ram (*Ovis orientalis erskinei*).

Typical locality Elburz Range, Persia.

So far as can be judged from the head and neck, the colour is less distinctly red than in the Cyprian and Armenian races, while there is a distinct front outer angle to the horns, and a strongly developed dark throat-ruff in winter. The front surface of the horns is consequently flatter than in the typical race, and distinctly defined from the outer one. In all these respects this race approximates to *O. vignei*, in which "perversion" of the horns may occur as an abnormality. Whether this race has a dark flank-band is not apparent.

4. 11. 18. 1. Mounted head (fig. 25). Southern flank of Elburz Range, Persia. Type.

Presented by the Hon. W. Erskine, 1904.

F.—Ovis orientalis isphahanica.

Ovis orientalis isphaganica, *Nasonov*, *Bull. Ac. Sci. St. Pétersb.* 1910, plate facing, p. 702.

Ovis urmiana isphahanica, *Nasonov*, *Bull. Ac. Sci. St. Pétersb.* 1911, p. 1290.

Ovis orientalis isphahanica, *Lydekker*, *The Sheep and Its Cousins*, p. 260, 1912.

Typical locality Ispahan, Persia.

The only description is in Russian.

No specimen in collection.

IV. OVIS LARISTANICA.

Ovis laristanica, *Nasonov*, *Bull. Ac. Sci. St. Pétersb.* 1909, p. 1179, 1911, p. 1295, pl.; *Lydekker*, *The Sheep and Its Cousins*, p. 260, 1912.

Typical locality Laristan, southern Persia.

Horns normally homonymous. General colour of upper-parts in winter (according to Nasonov) dark brownish yellow, with a dark band across the shoulders, behind and parallel to which is a white band, and in front a whitish patch, thus forming a kind of double saddle-patch. A blackish flank-band dividing the dark area from the white of the belly. Crown of head, forehead, and muzzle blackish; a black streak from eye to mouth, and below this a narrower grey one;

outer side of ears grey; tail whitish. Front and outer side of fore-legs above knees blackish tawny, and a streak of same down front of shank below white knees; elsewhere lower part of fore-legs and the whole of lower part of hind-legs white. A strong black throat-ruff, with some brownish yellow hairs; and long blackish hair on the neck, descending to the chest. In summer the general colour changes to chestnut, with almost complete obliteration of saddle-patch.

The Laristan sheep, of which there is no specimen in the collection, is provisionally allowed specific rank.

V. OVIS VIGNEI.

Ovis vignei, *Blyth*, *Proc. Zool. Soc.* 1840, p. 70; *Gray*, *List Mamm. Brit. Mus.* p. 169, 1843; *Sclater*, *Proc. Zool. Soc.* 1860, p. 127, pl. lxxix; *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, pt. 2, p. 153, 1873; *Brooke*, *Proc. Zool. Soc.* 1875, p. 526; *Sterndale*, *Mamm. India*, p. 435, 1884; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 138, 1891; *Blanford*, *Fauna Brit. India*, *Mamm.* p. 497, 1891; *True*, *Proc. U.S. Nat. Mus.* vol. xvii, p. 5, 1894; *Ward*, *Records of Big Game*, p. 250, 1896, ed. 6, p. 408, 1910; *Lydekker*, *Wild Oxen*, *Sheep*, *and Goats*, p. 166, pl. xii, 1898, *Game Animals of India*, *etc.* p. 99, 1907, *The Sheep and Its Cousins*, p. 261, 1912, *Cat. Hume Bequest Brit. Mus.* p. 9, 1913; *Pocock*, *Proc. Zool. Soc.* 1910, p. 859.

Ovis montana, *Cunningham*, *Ladak*, p. 199, 1854, nec *Schreber*.

Caprovis (Musimon) vignei, *Gray*, *Cat. Ungulata Brit. Mus.* p. 172, 1852, *Cat. Ruminants Brit. Mus.* p. 55, 1872.

Musimon vignei, *Gervais*, *Hist. Nat. Mamm.* vol. ii, p. 191, 1855; *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, p. 62, 1873.

Caprovis vignei, *Adams*, *Proc. Zool. Soc.* 1858, p. 526; *Gray*, *Hand-List Ruminants Brit. Mus.* p. 130, 1873.

URIN, URIAL, OR SHA.

Typical locality Astor.

Size medium; shoulder-height from 32 to 36 inches. Horns strongly wrinkled, curling forwards by sides of face in "ammon" fashion, generally forming little more than one complete turn, with the tips inclined inwards, although in some cases with slight terminal eversion; females with short upright horns. Throat of rams with a large and more or less black ruff of long stiff hairs, commencing behind the chin in two lobes, which soon unite to extend as a continuous fringe down the middle of the throat to the chest. Tail short, general colour of upper-parts rufous grey or fawn in summer, greyish brown in winter; under-parts, limbs, buttocks, and

tail whitish or white; ruff in some instances wholly black, but more generally with a mixture of white hairs, and in old rams white in front passing into black behind. Muzzle in old age whitish or white. A black or blackish patch behind shoulder, and in some instances a blackish flank-band and markings on outer side of limbs. Females and immature males almost uniformly greyish brown above and paler beneath.

Occasionally the tips of the horns display "perversion."

The range extends from Sind, the Trans-Indus districts of the Punjab, Afghanistan, Gilgit, Baluchistan, the Cis-Indus Salt Range, through Astor to Zaskar, Ladak, and Tibet, and also including parts of Russian Turkestan, Transcaspia, and Persia.

The following four races—some of which probably intergrade—may be recognised:—

A. Size large; colour tending to brownish or greyish.
  a. Horn-girth in five specimens from 10 to 12 inches; much black in ruff ..... *O. v. vignei.*
  b. Horn-girth from 10 to 12½ inches; front surface of horns much flattened; front of ruff mainly white ..... *O. v. arkar.*

B. Size apparently medium.
  Horn-girth from 9 to 11¾ inches; tips of horns tending to turn outwards, and their front angles often knotted ..... *O. v. cycloceros.*

C. Size smaller; colour redder than in A.
  Horn-girth from 8 to 10 inches..... *O. v. punjabiensis.*

A.—Ovis vignei vignei.

Ovis vignei typica. *Lydekker, Wild Oxen, Sheep, and Goats*, p. 171, 1898.

Ovis vignei vignei, *Lydekker, Cat. Hume Bequest Brit. Mus.* p. 9, 1913.

Typical locality Astor.

Size relatively large, reaching to at least 36 inches at shoulder, and body-colour tending to be browner or greyer than in *punjabiensis*. Horns with somewhat convex front surface, and a basal girth of from 10 to 12 inches. Much black in ruff, which is less developed than in other races. The range extends from Astor to Zaskar, Ladak, and probably Tibet.

6. 2. 10. 1. Skin, mounted, immature. Ladak.
Purchased, 1900.

51. 7. 16. 9. Skull, with horns, and skins. Ladak; collected by Gen. Strachey.
Presented by the Hon. East India Co., 1851.

51. 7. 16. 10. Horns. Ladak; collected by Gen. Strachey.
Same history.

56. 9. 22. 15. Skull, with horns. Ladak; collected by Gen. Abbott. *Purchased*, 1856.

88. 3. 20. 5. Skull, with horns. Indus side of Changchenmo Valley, Ladak. *Presented by R. Lydekker, Esq.*, 1888.

92. 7. 29. 2. Body-skin. Ramghat, junction of Astor River with Indus. *Presented by H. Littledale, Esq.*, 1892.

91. 8. 7. 176. Skull, with horns. Zaskar.
Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 177. Skull, with horns. Zaskar. *Same history.*

91. 8. 7. 178. Skull, with horns. Near Leh, Ladak.
Same history.

91. 8. 7. 179. Skull, with horns. Ladak. *Same history.*

91. 8. 7. 180. Skull, with horns. Ladak. *Same history.*

12. 10. 31. 99. Skull, with horns. Near Leh, at an elevation of 10,000 feet; collected by Ney Elias, Esq., the well-known Central Asian traveller. In this specimen, which stands No. 4 in Ward's list, the horns measure 36¼ inches in length by 11½ in girth, with a tip-to-tip interval of 4½ inches. The record horn-length is 39 inches.
Bequeathed by A. O. Hume, Esq., C.B., 1912.

1. 4. 15. 2–3. Two skins. Zoji-la, dividing Kashmir from Dras. *Presented by Capt. E. T. Holden*, 1901.

B.—Ovis vignei punjabiensis.

Ovis vignei punjabiensis, *Lydekker*, *Cat. Hume Bequest Brit. Mus.* p. 10, 1913.

Ovis cycloceros, *Sclater*, *Proc. Zool. Soc.* 1860, p. 128, pl. lxxx, 1887, p. 637; *Jerdon*, *Mamm. India*, p. 294, 1867; *Kinloch*, *Large Game Shooting*, pt. i, p. 29, 1869; *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, pt. 2, p. 153, 1873; *Blanford*, *Eastern Persia*, p. 87, 1876; *Sterndale*, *Mamm. India*, p. 435, 1884; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 138, 1891; nec *Hutton*.

Caprovis cycloceros, *Gray*, *Cat. Ruminants Brit. Mus.* p. 55, 1872.

Ovis vignei cycloceros, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 172, 1898, *Game Animals of India, etc.* p. 101, 1907, *The Sheep and Its Cousins*, p. 265, 1912; *Ward, Records of Big Game*, ed. 6, p. 408, 1910.

Typical locality Salt Range, Punjab.

Size relatively small, the shoulder-height being about 32 inches, and colour redder than in typical race. Horns of same general type as in latter, but with the basal girth usually ranging, in good specimens, from 8 to 10 inches; the curves nearly in one plane, and tending to form a circle. Ruff strongly developed.

Blanford * was the first to point out that the horns of the type of the true *cycloceros* differ in size from those of Punjab specimens.

91. * * *. Skin, mounted. Salt Range, Punjab.
Purchased, 1891.

68. 9. 12. 36. Skin, mounted; probably belonging to this race. Locality unknown.
Presented by the Zoological Society, 1868.

56. 5. 6. 81. Skull, with horns. Salt Range.
Presented by Dr. T. Oldham, 1856.

56. 5. 6. 82. Skull, with horns. Salt Range.
Same history.

56. 5. 6. 83. Skull, with horns. Salt Range.
Same history.

56. 5. 6. 84. Skull, female. Salt Range. *Same history.*

44. 9. 30. 19. Skull, with horns, probably referable to this race. Salt Range (?).
Presented by the Hon. East India Co., 1844.

12. 3. 19. 1. Skull, with horns, and skin. Nishnapur, Punjab. *Presented by Major J. W. Watson*, 1912.

66. 8. 10. 3. Skull, probably referable to this race. Punjab (?). *Presented by Dr. Hugh Falconer*, 1866.

91. 8. 7. 171. Skull, with horns. Akhor Hills, north of Campbellpur, Punjab.
Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 166. Skull, with horns. Salt Range.
Same history.

91. 8. 7. 169. Skull, with horns. Salt Range.
Same history.

* Mamm. India, p. 458.

12. 10. 31. 65. Skull, with horns. Salt Range. Length of horns 33½, girth 9¼, tip-to-tip interval 12½ inches. This is the second best urial definitely known to be from the Salt Range in Ward's list; the horn-length in the best being 34 inches. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

C.—Ovis vignei cycloceros.

Ovis cycloceros, *Hulton, Calcutta Journ. Nat. Hist.* vol. ii, p. 514; *Thomas, Trans. Linn. Soc.—Zool.* ser. 2, vol. v, p. 63, 1890.

Ovis blanfordi, *Hume, Journ. Asiat. Soc. Bengal*, vol. xlvi, p. 327, pl. iv, 1887; *Sclater, Proc. Zool. Soc.* 1887, p. 639.

Ovis vignei blanfordi, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 174, 1898, *Game Animals of India, etc.* p. 100, 1907, *The Sheep and Its Cousins*, p. 264, 1912, *Cat. Hume Bequest Brit. Mus.* p. 10, 1913; *Ward, Records of Big Game*, ed. 6, p. 408, 1910.

Typical locality Afghanistan.

Size probably medium. Horns tending to turn outwards at the tips, and forming a more open spiral than in the other

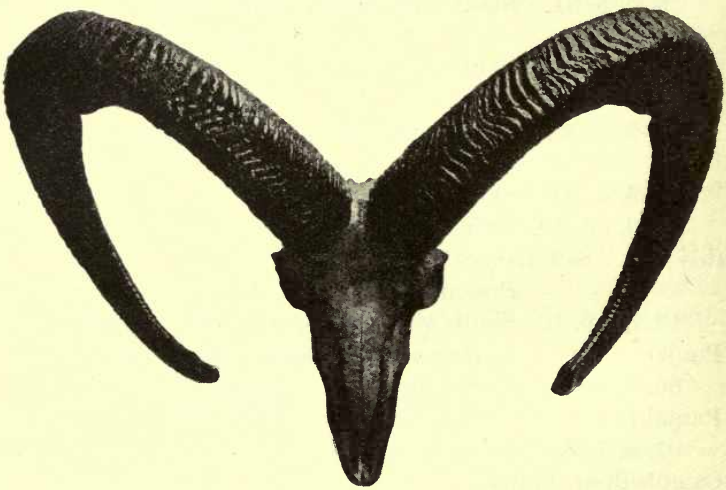


Fig. 26.—Skull and Horns of Afghan Urial (*Ovis vignei cycloceros*).

races, with the front angles prominent and occasionally showing a bended structure; basal girth in good specimens from 10 to 12¼ inches.

The urial of Waziristan and the Trans-Indus districts

generally, as well as of Baluchistan, are included in this race, which may perhaps also comprise the Sind form.

91. 8. 7. 170. Skull, with horns. Pishin Valley; collected by Col. Sir O. B. St. John, K.C.B.

Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 172. Skull, with horns. Kelat, Baluchistan. Topo-type of *blanfordi*. *Same history.*

91. 8. 7. 173. Skull, with horns. Pubbi Hills, Baluchistan. *Same history.*

91. 8. 7. 174. Skull, with horns. Quetta, Baluchistan. *Same history.*

91. 8. 7. 175. Skull, with horns. Haji Khan, Kelat. *Same history.*

12. 10. 31. 71. Skull, with horns. Kelat; collected by Dr. Duke. Type of *blanfordi*. Length of horns 34½, girth 9, tip-to-tip interval 17 inches.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 66. Skull, with horns. Haji Khan, Kelat. Length of horns 37½, girth 10¼, tip-to-tip interval 12 inches. These dimensions are exceeded by specimens from Waziristan. *Same history.*

12. 10. 31. 73. Skull, with horns. Seah Koh, Afghanistan; shot by Col. G. de Morton. *Same history.*

85. 2. 26. 1. Skin, mounted, Hills north of Peshawar, Punjab; collected by Major P. H. G. Powell-Cotton.

Purchased, 1885.

56. 9. 22. 16. Skin, mounted. Hills near Attock; collected by Gen. Abbott. *Purchased*, 1856.

56. 9. 22. 17. Skin, mounted. Hills near Attock; collected by Gen. Abbott. *Purchased*, 1856.

79. 11. 29. 28. Skin. Afghanistan. Figured by P. L. Sclater, *Proc. Zool. Soc.*, 1860, p. 127.

Transferred from India Museum, 1879.

79. 11. 21. 683. Skin, mounted, female. Afghanistan; collected by J. H. Griffiths, Esq., 1879. *Same history.*

79. 11. 21. 27. Skull, with horns. Afghanistan. *Same history.*

79. 11. 21. 28. Skull, with horns. Afghanistan. *Same history.*

86. 10. 15. 21. Mounted head. Gulran, Afghanistan;

obtained during the expedition of the Afghan Boundary Commission, 1884–5, by Dr. J. E. T. Aitchison.

Presented by the Government of India, 1886.

86. 10. 15. 22. Skull, with horns. Gulran; same collector. *Same history.*

86. 10. 15. 23. Frontlet and horns. Gulran; same collector. *Same history.*

86. 10. 15. 24. Head, mounted. Khusan, Afghanistan, 24/11/84; same collector. *Same history.*

86. 10. 15. 25. Head, female, mounted. Khusan, 24/11/84; same collector. *Same history.*

86. 10. 15. 26. Head, young, mounted. Kambas, Afghanistan, 1/5/85; same collector. *Same history.*

86. 10. 15. 27. Skin, immature. Chasma Satz Pass, Afghanistan; same collector. *Same history.*

11. 10. 10. 1. Head, mounted. Chitral.

Presented by Capt. R. A. Lyall, 1911.

91. 9. 23. 1. Skull, provisionally referred to this race.

Presented by Messrs. Torr & Co., 1891.

D.—Ovis vignei arkar.

Ovis arkar, *Brandt, Lehman's Reise nach Buchara, in Beitr. Russ. Reich.* p. 310, 1852.

Ovis arkal, *Blasius, Säugeth. Deutschl.* p. 469, figs. 243, 244, 1857; *Severtzow, Trans. Soc. Nat. Moscow*, vol. v, art. 2, p. 153, 1873; *Peters. Monatsber. Ak. Berlin*, 1876, p. 180; *Radde and Walter, Zool. Jahrb. Abt. f. Syst.* 1889, p. 1065, *Wiss. Ergeb. Transcasp.* vol. i, *Zool.* p. 1065, 1890; *Matschie, Sitzber. Ges. nat. Freunde*, 1896, p. 97; *Lydekker, Great and Small Game of India, etc.* p. 92, 1900.

Caprovis (Argali) arkal, *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 250, 1862.

Caprovis arkal, *Gray, Cat. Ruminants Brit. Mus.* p. 56, 1872.

Ovis vignei arkal, *Lydekker, Game Animals of India, etc.* p. 101, 1907, *Field*, vol. cix, pp. 147, 1118, 1907, *The Sheep and Its Cousins*, p. 265, 1912; *Kennion, Field*, vol. cix, p. 529, 1907, *By Mountain, Lake, and Plain*, p. 208, 1911*; *Ward, Records of Big Game*, ed. 6, p. 408, 1910.

Ovis arcar, *Nasonov, Bull. Ac. Sci. St. Pétersb.* 1913, p. 7.

Ovis arcar arcar, *Nasonov, op. cit.* p. 14.

Including.

Ovis vignei varentsowi, *Satunin, Zanukok Kaukas. Omd.* vol. xxv, p. 41, 1905, *Mitt. Kaukas. Mus.* vol. ii, p. 375, 1906.

* Name misprinted *vigeni*.

Ovis arcar varenzovi, *Nasonov*, *Bull. Ac. Sci. St. Pétersb.* 1913, p. 19.
Ovis arcar dolgopolovi, *Nasonov*, *op. cit.* p. 25.

Typical locality Ust-Urt Plateau, Transcaspia.

O. v. varentzowi is from the Kopet-Dagh, between Persia and Turkestan. Nasonov's memoir being in Russian, the present writer cannot form an opinion as to the validity of

Fig. 27.—Head of Kopet-Dagh Urial (*Ovis vignei arkar*).

O. a. dolgopolovi, which is founded on two heads collected by Karelin, it is believed, in the neighbourhood of Astrabad.

Size (*teste* Kennion) very large, but measurements of height not available. Horns with the front surface much flattened and sparsely wrinkled, and the two front angles strongly developed; frequently forming more than a complete circle; basal girth in fine specimens from 10 to 12¼ inches.

Ruff almost wholly white in front in adult rams; this being very markedly the case in the head figured by Nasonov * as *O. arcar dolgopolovi;* general colour of body rufous.

The urial of the Kopet-Dagh and Ala-Dagh do not appear separable from this race.

7. 12. 14. 1. Head, mounted. Bujnurd, Ala-Dagh, Seistan, Persia. *Presented by Major R. L. Kennion*, 1907.

9. 11. 17. 1. Skull, with horns. Bujnurd. *Same donor*, 1909.

10. 4. 16. 1. Skull, with horns. Bujnurd. *Same donor*, 1910.

10. 4. 16. 2. Skull, with horns. Bujnurd. *Same history.*

7. 7. 5. 3. Skull, with horns, and skin. Kopet-Dagh, on Persian and Turkestan border. *Same donor*, 1907.

7. 7. 5. 2. Skull, with horns, and skin. Kopet-Dagh. *Same history.*

2. 11. 24. 1. Skull, with horns. Kopet-Dagh. *Presented by St. George Littledale, Esq.*, 1902.

94. 5. 31. 2. Skull, with horns. Turkestan. *Purchased*, 1894.

8. 6. 10. 3. Skull, female. Khorasan, Persia. *Presented by Major P. M. Sykes*, 1908.

11. 8. 24. 6. Skin, female. Bujnurd. *Presented by Major R. L. Kennion*, 1911.

VI. OVIS AMMON.

Capra ammon, *Linn. Syst. Nat.* ed. 10, p. 70, 1757, ed. 12, vol. i, p. 97, 1766; *Fischer, Synop. Mamm.* p. 487, 1829.

Ovis argali, *Pallas, Spicil. Zool.* fasc. xi, p. 20, 1777–80; *Blasius, Säugeth. Deutschl.* p. 468, 1857; *Radde, Reise Öst.-Siber.* p. 236, 1862; *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, pp. 150 and 154, 1873, *Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 209, 1876; *Peters, Monatsber. Ak. Berlin*, 1876, p. 180; *Brehm, Tierleben*, ed. 3, *Säugeth.* vol. iii, p. 222, 1891.

Ovis ammon, *Erxleben, Syst. Regn. Anim.—Mamm.* p. 250, 1777; *Schreber, Säugthiere*, pl. 288, 1788; *Wagner, Suppl. to same*, vol. iv, p. 1349, 1844; *Shaw, Gen. Zool.* pl. cci, 1800–1812; *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 317, v, p. 359, 1827; *Jardine, Nat. Libr.-Mamm.* vol. iv, p. 137, 1836; *Brooke, Proc. Zool. Soc.* 1875, p. 518; *Blanford, ibid.* 1896, p. 787; *Ward, Records of Big Game*, p. 243, 1896, ed. 6, p. 398, 1910; *Matschie, Sitzber. Ges. nat. Freunde*, 1896, p. 99; *Lydekker, Wild Oxen, Sheep,*

* *Op. cit.* pl. iii.

and Goats, p. 174, pl. xiv, 1898, *Game Animals of India, etc.* p. 95, 1907, *The Sheep and Its Cousins*, p. 268, 1912, *Cat. Hume Bequest Brit. Mus.* p. 5, 1913; *Pousargues, Mém. Soc. Zool. France*, 1898, p. 146; *Sclater, Proc. Zool. Soc.* 1899, pl. viii.

Ægoceros argali, *Pallas, Zoogr. Rosso-Asiat.* vol. i, p. 231, 1811.

Caprovis (Argali) argali, *Gray, Cat. Ungulata Brit. Mus.* p. 174, 1852, *Cat. Ruminants Brit. Mus.* p. 57, 1872.

Musimon argali, *Gervais, Hist. Nat. Mamm.* vol. ii, p. 191, 1855.

Caprovis argali, *Gray, Hand-List Ruminants Brit. Mus.* p. 132, 1873.

ARGALI.

Size typically very large (46 to 48 inches at shoulder). Horns large and strongly wrinkled, curving forwards by the side of the face in a close or open spiral, with the tips directed markedly outwards, and the whole often forming considerably more than one complete circle. Tail very short; generally white or whitish. Frequently a large white and comparatively short-haired throat-ruff, at least in winter; often a dark nuchal, and in some instances a dorsal crest. Generally no distinct dark flank-band dividing the fawn of the upper-parts from the white of the belly; in some cases a blackish patch behind upper part of fore-leg. Summer coat very short and frequently pale-coloured, showing a large amount of white on hind-quarters, which may extend over a considerable portion of the thighs, and more or less white on muzzle. Winter coat close, thick, and darker. Face-gland and lachrymal pit large.

Typical locality Altai, probably the Semipalatinsk district.

The available material in the collection is quite insufficient to give a complete diagnosis of this very variable sheep—inclusive of seasonal colour-changes; while it is still less possible to give a complete "key" to the local races, several of which probably intergrade.

The following provisional key includes some of the better-known of these races:—

A. Size large (highest at shoulder, 48 in. in *O. a. ammon*).

a. Horns massive and thick, with first turn of spiral approximated to face.

a'. Horns very massive, with descending portion inclined inwards, tops directed much outwards, and front outer angle rounded off, the whole

forming more than a complete circle; length from 59 to 62 in., girth 18 to 20 in. No ruff*..... *O. a. ammon.*

b'. Horns less everted, with first turn nearly vertical, forming about a circle, and front outer angle often distinct; length from 48½ to 57 in., girth 17 to 19 in. A ruff at all seasons*..... *O. a. hodgsoni.*

c'. Closely allied to last, but with front outer angle of horns rounded off. Known horns ranging from 41 to 50½ in. in length, with a girth of from 16½ to 18 in..... *O. a. mongolica.*

d'. Horns smaller; length from about 45½ to 47 in., girth 14½ to 15½ in..... *O. a. sairensis.*

b. Horns slighter and forming a more open curve, frequently with outer front angle strongly pronounced.

a'. General colour in winter rufous, thighs coloured like back, no distinct rump-patch, tail yellowish above, muzzle white; throat-ruff yellowish.

Horns moderately extended; length 55 to 58 in., girth 17 in..... *O. a. littledalei.*

b'. General colour in winter pale fawn, thighs, rump-patch, tail, and ruff white; face light-coloured.

a''. Horns of general type of *littledalei*, but apparently somewhat thicker; rump-patch small..... *O. a. karelini.*

b''. Horns of same general type, but with outer front angle frequently rounded off; rump-patch larger..... *O. a. humei.*

c''. Horns slender and forming a more open and extended spiral than in any of the other races, with front outer angle generally pronounced; length of fine specimens 69 to 75 in., girth 14½ to 16 in., or, rarely, 17 in..... *O. a. poli.*

B. Size smaller.

a. General colour in winter dark brown, gradually shading into white of under-parts, a white rump-patch and muzzle, tail greyish brown above, throat-ruff greyish white. Horns of the *littledalei* type; length 35¾ to 38 in., girth 10¼ in. *O. a. nigrimontana.*

b. Imperfectly known. Horns apparently more of the *ammon* form; length in type 40 in., girth 11½ in..... *O. a. storcki.*

* Blanford, *Proc. Zool. Soc.* 1896, p. 787.

The range of the argali extends from Bokhara, through the Altai and Tibet to the Gobi Desert of Mongolia, and also includes western Kamchatka.

A.—Ovis ammon ammon.

Ovis argali altaica, *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 154, 1873.

Ovis ammon typica, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 177, 1898; *Ward*, *Records of Big Game*, ed. 6, p. 398, 1910.

Typical locality Semipalatinsk, Altai.

Largest of all sheep, the shoulder-height reaching to about 48 inches. Horns very massive, with descending portion inclined inwards, so that the horns are greatly

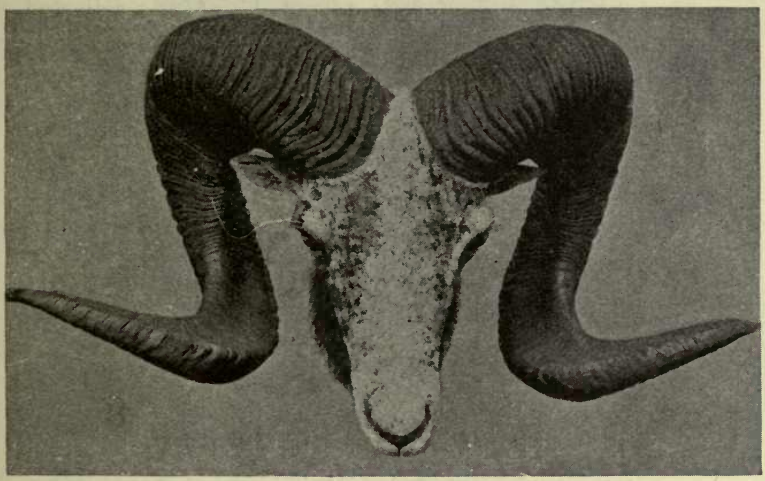


Fig. 28.—Head of Siberian Argali (*Ovis ammon ammon*).

"nipped in" by the sides of the face, the tips directed much outwards, so that the entire horn forms rather more than a complete circle, and both front angles rounded off; length in fine specimens from 59 to 62, girth from 18 to 20 inches. No throat-ruff, at any rate in summer. General colour of head, neck, body, and limbs externally to knees and hocks, in winter,* rufous brown tinged with grey; the latter

* The specimen (No. 45. 4. 21. 9) from which this description is mainly taken, was considered by Sir V. Brooke (*Proc. Zool. Soc.* 1875, p. 519) to be in summer coat, but is certainly in winter dress.

predominating on face, and also pronounced on upper part of neck and shoulders; under-parts more rufous; upper side of tail fawn; a white rump-patch present in some instances, but in others represented merely by a paler area on lower part of buttocks.*

In summer the whole coat (No. 98. 2. 6. 8) very short, and of a pale tint approximating to that of whitey brown paper; a white rump-patch.

The range of this race, which formerly included a considerable portion of the Altai, cannot be fully defined.

45. 4. 21. 9. Head, mounted, and body-skin (winter coat). Altai, Siberia; collected by Dr. Brandt. Described by Brooke, *Proc. Zool. Soc.*, 1875, p. 519. *Purchased*, 1845.

45. 4. 21. 10. Skin, female, mounted. Altai; collected by Dr. Brandt. *Purchased*, 1845.

98. 2. 6. 8. Skin, mounted (summer coat). Altai. *Presented by St. George Littledale, Esq.*, 1898.

98. 2. 6. 9. Skeleton. Altai. *Same history.*

96. 10. 14. 1. Head (fig. 28), mounted (summer coat). Altai. *Presented by Major C. S. Cumberland*, 1896.

96. 10. 14. 2. Skull, with horns, and scalp-skin. Altai. *Same history.*

95. 12. 13. 1. Imperfect skin. Kokagutch, N.W. Altai. *Same donor*, 1895.

97. 5. 18. 1. Head-skin. Altai. *Same donor*, 1897.

78. 12. 21. 23. Skin, female, mounted, provisionally referred to this race. Arcat Mountains, Siberia; collected by Dr. O. Finsch.

By exchange with Bremen Grographical Society, 1878

B.—Ovis ammon mongolica.

Ovis argali mongolica, *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 154, 1873.

Ovis jubata, *Peters*, *Monatsb. Ak. Berlin*, 1876, p. 117, pls. i–iv; *Przewalski*, *Cat. Zool. Coll.* p. 15, 1887; *Noack*, *Zool. Anz.* 1902, p. 626.

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* In the passage cited Brooke states that there is no rump-patch in No. 45. 4. 21. 9, but that a large one is present in a specimen in the Leyden Museum obtained by the same collector (Brandt), and therefore probably from the same district.

Ovis ammon jubata, *Lydekker*, *Wild Oxen*, *Sheep*, *and Goats*, p. 180, 1898, *Great and Small Game of India*, *etc.* p. 126, 1901, *The Sheep and Its Cousins*, p. 271, 1912; *Ward*, *Records of Big Game*, ed. 6, p. 402, 1910.

(?) Ovis argali dauricus, *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 87, pl. iv, 1873.

(?) *Ovis darwini*, *Przewalski*, *Reisen in Tibet*, 268, 1879–80.

Typical locality the Gobi Desert of Mongolia.

An imperfectly known race in some respects intermediate between *ammon* and *hodgsoni*, the horns, although less "nipped in" by the sides of the face, having their front

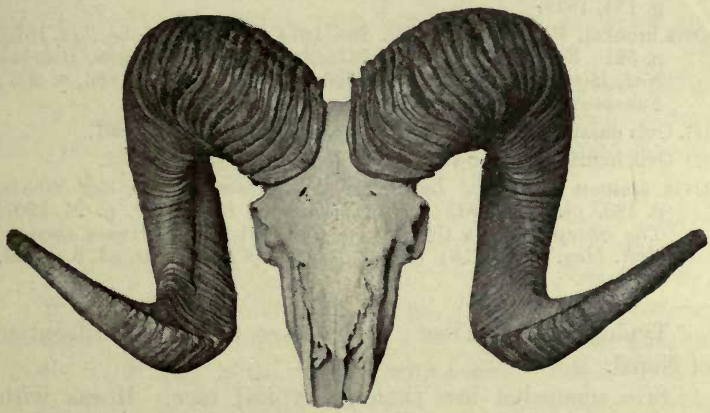

Fig. 29.—Skull and Horns of Mongolian Argali (*Ovis ammon mongolica*).
From a specimen collected by Col. Abbot Anderson.

angles rounded off, as in the former, while the throat carries a heavy ruff like that of the latter. In the few horns of which measurements have been recorded the length ranges from 41 to 50½ inches, and the girth from 16½ to 18 inches.

No specimen in collection.

C.—Ovis ammon hodgsoni.

Ovis nayaur, *Hodgson*, *Asiat. Research*, vol. xviii, pt. 2, p. 135, 1833, in part.

Ovis hodgsoni, *Blyth*, *Proc. Zool. Soc.* 1840, p. 65; *Sclater*, *ibid.* 1860, p. 129; *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, pp. 151 and 154, 1873; *Brooke*, *Proc. Zool. Soc.* 1875, p. 520; *Sterndale*, *Mamm. India*, p. 427, 1884; *Pousargues*, *Mém. Soc. Zool. France*, 1898, p. 148; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.*

pt. ii, p. 136, 1891; *Blanford, Fauna Brit. India, Mamm.* p. 494, 1891; *Ward, Records of Big Game*, p. 293, 1896.

Ovis ammonoides, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. x, pp. 230 and 913, 1841, xv, p. 338, 1846; *Hutton, ibid.* vol. xvi, p. 568, 1847.

Ovis ammon, *Horsfield, Cat. E. Ind. Mus.* p. 176, 1851; *Kinloch, Large Game Shooting*, pt. i, p. 19, 1869; *Blanford, Journ. Asiat. Soc. Bengal*, vol. xli, p. 40, 1872, nec *Linn.*

Caprovis bambhera, *Gray, Cat. Ungulata Brit. Mus.* pl. xvi, 1852, *Cat. Ruminants Brit. Mus.* p. 57, 1872, *Hand-List Ruminants Brit. Mus.* p. 132, 1873.

Caprovis argali, *Adams, Proc. Zool. Soc.* 1858, p. 527, nec *O. argali, Pallas.*

Ovis blythi, *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 154, 1873.

Ovis brookei, *Ward, Proc. Zool. Soc.* 1874, p. 143; *Brooke, ibid.* 1875, p. 521; *Sterndale, Mamm. India*, p. 434, 1884, *Journ. Bombay Nat. Hist. Soc.* vol. i, p. 35, 1886, *Proc. Zool. Soc.* 1886, p. 205; *Pousargues, Mém. Zool. Soc. France*, 1898, p. 153.

(?) Ovis dalai-lamæ, *Przewalski, Cat. Zool. Coll.* p. 16, 1887.

(?) Ovis henrii, *Milne-Edwards, Rev. gen. Sci.* 1892, p. 672.

Ovis ammon hodgsoni, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 180, pl. xv, 1898, *Game Animals of India, etc.* p. 95, 1907, *The Sheep and Its Cousins*, p. 269, 1912, *Cat. Hume Bequest Brit. Mus.* p. 6, 1913; *Ward, Records of Big Game*, ed. 6, p. 399, 1910.

Typical locality Tibet; probably on the northern frontier of Nepal.

Size somewhat less than in typical race. Horns with the tips (which are often broken) less everted than in *ammon*, the descending portion nearly vertical, the front outer angle often distinct, and the whole forming about one complete circle; length in fine specimens from 48½ to 57, girth from 17 to 19 inches. A large throat-ruff, apparently at all seasons, and a nuchal crest. General colour greyish brown above, paler and whitish below; rump-patch, buttocks, throat, chest, under-parts, and inner sides of the legs white; crest and a stripe down front of each leg dark. In old rams the back becomes grizzled, owing to the presence of white hairs. A dark mark above tail. In females there is little or no crest and no ruff, while the white is less pure, and the rump-patch less distinct.

This is stated to be the summer coloration by Blanford, who suggests that the winter colouring is paler; but this is not supported by what occurs in *ammon*.

79. 11. 21. 661. Skin, mounted. Ladak; collected by Messrs. Schlagintweit. *Transferred from India Museum*, 1879.

79. 11. 21. 686. Immature skin, mounted, provisionally referred to this species and race. Ladak. *Same history.*

91. 10. 7. 165. Skin, mounted (winter coat). Sikhim collected by L. Mandelli, Esq. Also skull.
Presented by Dr. W. T. Blanford, 1891

91. 10. 7. 166. Skin (winter coat). Sikhim; same collector. Also skull. *Same history.*

58. 6. 24. 27. Skin. Nepal.
Presented by B. H. Hodgson, Esq., 1858

79. 11. 21. 21. Skull, with horns. Tibet; collected by B. H. Hodgson, Esq. Co-type.
Transferred from India Museum, 1879.

79. 11. 21. 22. Skull, with horns. Tibet; same collector. Co-type. *Same history.*

45. 1. 8. 150. Skull, with horns. Tibet.
Presented by B. H. Hodgson, Esq., 1845.

45. 1. 8. 151. Skull, immature, with horns. Tibet.
Same history.

45. 1. 8. 149. Frontlet and horns. Tibet. *Same history.*

45. 1. 8. 148. Horns. Tibet. *Same history.*

48. 6. 11. 22. Skull, female, with horns. Tibet.
Same donor, 1848.

58. 6. 24. 23. Skull, with horns. Sikhim.
Same donor, 1858

79. 11. 21. 489. Skull, female. Ladak; collected by Gen. Strachey. *Transferred from India Museum*, 1879.

79. 11. 21. 585. Skull, with horns. Ladak; same collector. *Same history.*

51. 7. 16. 12. Skull, with horns. Ladak; same collector.
Presented by the Hon. East India Co., 1851.

51. 12. 22. 2. Skull, with horns. Ladak; same collector
Same history.

56. 9. 22. 14. Skull, female. Ladak; collected by Gen. Abbott. *Purchased*, 1856

56. 9. 22. 18. Skull, with horns. Ladak; collected by Gen. Abbott. *Purchased*, 1856.

59. 8. 7. 1. Skull, with horns, and skin. Ladak.
Presented by Col. Congreve, 1859.

67. 10. 4. 1. Skull, with horns. Tibet; collected by E. Blyth, Esq. *Purchased*, 1867.

88. 3. 20. 4. Skull, with horns. Changchenmo Valley, Ladak. *Presented by R. Lydekker, Esq.*, 1888.

91. 8. 7. 181. Skull, with horns. Hanle, Spiti. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 182. Skull, with horns. Ladak. *Same history.*

91. 8. 7. 183. Skull, with horns. Ladak. *Same history.*

91. 8. 7. 184. Skull, with horns. Ladak. *Same history.*

91. 8. 7. 185. Skull, female, with horns. Sikhim; collected by L. Mandelli, Esq. *Same history.*

91. 8. 7. 186. Skull, with horns. Hundes, Tibet; collected by N. Troup, Esq. *Same history.*

91. 8. 7. 187. Skull, with horns. Hundes; same collector. *Same history.*

12. 10. 31. 67. Skull, with horns. Ladak; collected by A. Dalgleish, Esq. The length of the horns is 46½, the girth 19¾, and the interval between the tips 20 inches; the corresponding dimensions in the record specimen being 57, 18¾, and 29 inches. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

12. 10. 31. 68. Skull, with horns. Chantang, Rudok, Western Tibet, near the Pangong Lake. *Same history.*

12. 10. 31. 69. Skull, with horns. Ma Chan, Gartok, Western Tibet. *Same history.*

12. 10. 31. 70. Skull, with horns. Hundes. *Same history.*

D.—Ovis ammon storcki.

Ovis storcki, *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xx, p. 293, 1904.
Ovis ammon storcki, *Ward, Records of Big Game*, ed. 6, p. 398, 1910; *Lydekker, The Sheep and Its Cousins*, p. 275, 1912.

Typical locality Western Kamchatka.

A small and very imperfectly known race, with horns apparently of the *ammon* type, but, in the type specimen, measuring only 40 inches in length and 11½ in girth.

No example in the collection.

E.—Ovis ammon sairensis.

Ovis sairensis, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 185, fig. 1898, *Proc. Zool. Soc.* 1900, p. 113, *Great and Small Game of India, etc.* p. 127, 1900; *Noack*, *Zool. Anz.* 1902, p. 696.

Ovis ammon sairensis, *Lydekker*, *Field*, vol. cxiii, p. 117, 1909, *The Sheep and Its Cousins*, p. 275, 1912; *Ward*, *Records of Big Game*, ed. 6, p. 403, 1910.

Typical locality the Saiar, Sair, or Jair Mountains of Zungaria.

Considerably smaller than *hodgsoni*, but with relatively massive horns, which form rather more than a complete circle, and measure (in the few specimens known) from 45½ to 47 inches in length, and 14½ to 15½ in length. In summer the whole of the upper-parts, with the exception of the white muzzle, as well as the upper portion of the legs, are reddish fawn, there being no rump-patch, while most of the under-parts are darker. Females with a dark dorsal streak.

The range includes the Semitau, north of the Sair Mountains, but the sheep, with a large white rump-patch, from the Irtish Valley, north of Lake Balkash, referred to this race by the present writer in the *Proc. Zool. Soc.* for 1900, is probably distinct.

90. 4. 30. 3. Skin, mounted. Saiar Mountains, Zungaria. Type. *Presented by St. George Littledale, Esq.*, 1890.

90. 4. 30. 4. Skin, immature, mounted. Saiar Mountains. *Same history.*

90. 4. 30. 5. Skin, female, mounted. Saiar Mountains. *Same history.*

90. 4. 30. 5, *a*. Skull of last specimen.

90. 4. 30. 6. Skeleton, mounted. Saiar Mountains. *Same history.*

90. 4. 30. 7. Skull. Saiar Mountains. *Same history.*

2. 6. 2. 3–4. Two skins. Same locality. *Same donor*, 1902.

The following specimens have been provisionally referred to this race, but are probably distinct:—

0. 3. 26. 2. Skull, with horns, and skin. Puchtawa, Irtish Valley. *Presented by the Hon. Walter Rothschild*, 1900.

0. 3. 26. 3. Skull, female, with horns, and skin. Puchtawa. *Same history.*

F.—Ovis ammon littledalei.

Ovis sairensis littledalei, *Lydekker*, *Proc. Zool. Soc.* 1912, p. 82, pl. vii.

Ovis ammon littledalei, *Lydekker*, *Field*, vol. cxiii, p. 117, 1909, *The Sheep and Its Cousins*, p. 276, 1912, *Cat. Hume Bequest Brit. Mus.* p. 7, 1913; *Ward*, *Records of Big Game*, ed. 6, p. 404, 1910.

Typical locality south-east of Kulja, or Ili, Tian Shan.

Horns (fig. 30) shorter and less expanded than in *poli* p. 106), forming a little more than one complete turn; length in fine specimens 55 to 58, girth 17 inches. Head brownish grey, with a nearly pure white muzzle; throat-ruff pale yellowish fawn; general colour of upper-parts (including nape) bright rufous fawn, rather darker on

Fig. 30.—Skull and Horns of Kulja Argali (*Ovis ammon littledalei*).

middle of back, but no distinct dorsal line or flank-band; thighs coloured like back; no light rump-patch; tail pale yellowish fawn, with a whitish tinge; fore-legs whitish grey in front to knee, where there is a yellowish patch; hind-legs whitish grey in front nearly to hoofs, above which they are light fawn; throat-ruff coloured much like tail.

2. 3. 9. 7. Head, mounted. South-east of Kulja, or Ili. Type. *Presented by St. George Littledale, Esq.*, 1902.

2. 3. 9. 8. Skin. Same locality. Co-type. *Same history.*

5. 3. 6. 1. Skull, with horns. Same locality. *Presented by A. Bayley-Worthington, Esq.*, 1905.

13. 2. 6. 1. Skin. Same locality. *Presented by Col. J. H. Abbot Anderson*, 1913.

2. 3. 9. 6. Skin. Upper Kok, Tian Shan. Reference provisional. *Presented by St. George Littledale, Esq.*, 1902.

1. 11. 1. 91. Skin. Saisan Nor, north of Kulja. Reference provisional. *Presented by Lord Elphinstone*, 1901.

The following specimens, which are not racially determined, represent sheep more or less nearly allied to *littledalei* and *karelini* :—

98. 2. 6. 9. Skull, with horns. Tarbagatai, Altai. *Presented by St. George Littledale, Esq.*, 1898.

91. 6. 17. 3. Skull, with horns. Semitau, Altai. *Same donor*, 1891.

5. 3. 21. 1. Skull. Cymbsi Hills. *Presented by Lord Osborne Beauclerk*, 1905.

G.—Ovis ammon nigrimontana.

Ovis nigrimontana, *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 87, 1873, *Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 211, 1876; *Brooke*, *Proc. Zool. Soc.* 1875, p. 517; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. 2, p. 132, 1891; *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 202, 1898; *Carruthers*, *Field*, vol. cxiv, p. 623, 1909.

Ovis ammon nigrimontana, *Lydekker*, *Field*, vol. cxiv, p. 663, 1909, *The Sheep and Its Cousins*, p. 279, 1912; *Ward*, *Records of Big Game*, ed. 6, p. 404, 1910.

Fig. 31.—Skull and Horns of Bokharan Argali (*Ovis ammon nigrimontana*).

From a specimen collected by Mr. D. Carruthers.

Typical locality Karatau, Bokhara.

Horns of the *littledalei* type, but much smaller; length $35\frac{3}{4}$ to 38, girth $10\frac{1}{4}$ inches in the two described specimens. Colour, in winter, of a Samarkand ram, dark brown above, slightly paler on neck, and becoming greyish brown on flanks; throat-ruff white tinged with grey; head darker than neck, with white muzzle; rump-patch and under-parts white; tail greyish brown above; legs dirty white with dark reddish brown stripe in front, which is narrower and paler in hind than in front pair. In young rams the ruff is little developed and the general colour more rufous.

No example in the collection.

H.—Ovis ammon karelini.

Ovis karelini, *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, pp. 84, 86, pl. i, 1873, *Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, pp. 171, 210, 1876.

Ovis poli karelini, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 197, 1898, *partim*.

Ovis ammon karelini, *Lydekker*, *Field*, vol. cxiii, p. 117, 1909, *The Sheep and Its Cousins*, p. 275, 1912, *Cat. Hume Bequest Brit. Mus.* p. 8, 1913; *Ward*, *Records of Big Game*, ed. 6, p. 404, 1910.

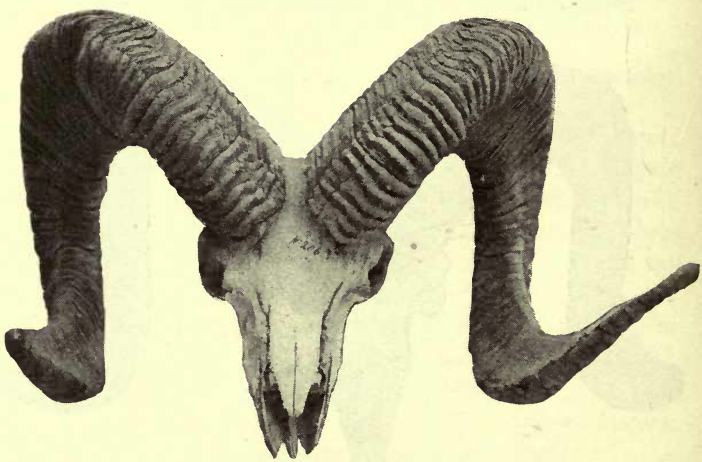

FIG. 32.—SKULL AND HORNS OF ALATAU ARGALI (*Ovis ammon karelini*).

From a specimen in Sir E. G. Loder's collection.

Typical locality Alatau, Semirechensk, Altai.

Horns of the general type of *littledalei*, but rather heavier; length in two specimens 45½ and 49½, girth 14¾ and 16¼ inches. Head pale fawn on forehead and cheeks, shading into white on muzzle; throat-ruff white, shaded with grey; general colour light brown, becoming lighter towards tail, where it is greyish white; a distinct dark dorsal streak and broad flank-band; a rather small white rump-patch, which includes the white tail; hind surface of thighs white, gradually shading into fawn of fore part of sides of same; front of fore-legs to knees, and lines on outer and inner sides of hind-legs to hoofs pale fawn; under-parts yellowish white.

No authenticated specimen in the collection.

I.—Ovis ammon heinsi.

Ovis heinsi, *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 87, 1873, *Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 211, 1876; *Brooke*, *Proc. Zool. Soc.* 1875, p. 517; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 132, 1891; *Shitkow and Sabanejew*, *Zool. Jahrb. Abt. f. Syst.* vol. xxviii, p. 457, 1909.

Ovis ammon heinsi, *Lydekker*, *The Sheep and Its Cousins*, p. 281, 1912.

Typical locality Tokmak district, north-west of Lake Issik, and therefore not far from the Alatau, the typical locality of *karelini*.

Typified by subadult skulls, with horns, the description of which is insufficient to furnish a clue to the affinity of this race. The size is stated to be rather less than in *karelini*, to which the horns of this race seem to approximate.

No specimen in the collection.

J.—Ovis ammon humei.

Ovis ammon humei, *Lydekker*, *Cat. Hume Bequest Brit. Mus.* p. 6, 1913.

Ovis poli, *Stoliczka*, *Proc. Zool. Soc.* 1874, p. 425, pl. liii; *Blanford*, *Fauna Brit. India*, *Mamm.* p. 496, 1891; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 133, 1891, nec *Blyth*.

Ovis heinsi (?), *Blanford*, *Journ. Asiat. Soc. Bengal*, vol. xliv, pt. 2, p. 112, 1875, nec *Severtzow*.

Ovis karelini, *Brooke*, *Proc. Zool. Soc.* 1875, p. 512; *Blanford*, *Scient. Results 2nd Yarkand Miss.—Mamm.* p. 80, 1879, nec *Severtzow*.

Ovis sculptorum, *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 245, 1884, nec *Blyth.*

Ovis poli karelini, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 197, 1898, *partim.*

Typical locality Tian Shan, north-west of Kashgar.

Horns more or less of the *littledalei* type, but with the outer front edge rounded in adults; length in co-type 47, girth 13¼ inches. Head greyish brown above and at sides, but whitish on most of face; back brownish grey, without dark dorsal streak, and no distinct flank-band; under-parts, limbs (including whole of thighs), a large rump-patch, and tail pure white. In females a dark dorsal stripe from nape to root of tail in winter coat.

79. 11. 21. 246. Skin, mounted. Tian Shan, north-west of Kashgar; collected by Second Yarkand Mission, 1873. Type. *Transferred from India Museum*, 1879.

79. 11. 21. 246, *a*. Skull of same.

79. 11. 21. 249. Skin, mounted. Same locality and collection. *Same history.*

79. 11. 21. 249, *a*. Skull of same.

75. 10. 9. 1. Skull. Tian Shan, north-west of Kashgar. Second Yarkand Expedition.

Presented by Gen. Sir T. E. Gordon, K.C.B., 1875.

12. 10. 31. 87. Skull with horns, apparently immature. Co-type. Tian Shan, north of the Maralbashi Forest; collected by A. Dalgleish, Esq. Length along outer curve 47, girth 13¼, tip-to-tip 40 inches. Entered in Hume Catalogue as frontlet. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

K.—Ovis ammon poli.

Ovis poli, *Blyth, Proc. Zool. Soc.* 1840, p. 62, *Ann. Mag. Nat. Hist.* ser. 1, vol. vii, p. 195, pl. v, 1841 (polii); *Gray, Cat. Ungulata Brit. Mus.* p. 165, 1852, *Cat. Ruminants Brit. Mus.* p. 54, 1872, *Hand-List Ruminants Brit. Mus.* p. 130, 1873; *Gerrard Cat. Bones Mamm. Brit. Mus.* p. 254, 1862; *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, pp. 150 and 154, pls. ii and iii, 1873, *Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 171, 1876; *Brooke, Proc. Zool. Soc.* 1875, p. 514; *Blanford, Scient. Result, 2nd Yarkand Miss.—Mamm.* p. 83, 1879, *Proc. Zool. Soc.* 1884, p. 326, *Fauna Brit. India, Mamm.* p. 496, 1891; *Biddulph, Proc. Zool. Soc.* 1875, p. 157, *Proc. Asiat. Soc. Bengal*, 1879, p. 280; *Scully, Proc. Zool. Soc.* 1881, p. 209; *Sterndale, Mamm. India*, p. 424, 1884; *Pousargues, Mém. Soc. Zool. France*, 1888, p. 141 (poloi), in part; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 133,

1891; *De Poucins, Journ. Bombay Nat. Hist. Soc.* vol. x, p. 53, 1895; *Ward, Records of Big Game*, p. 240, 1896; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 188, 1898, *Great and Small Game of India*, p. 129, 1901, *Game Animals of India, etc.* p. 91, 1907; *Brehm, Tierleben*, ed. 3, *Säugeth.* vol. iii, p. 228, 1901.

(?) Ovis arkar, *W. L. Sclater, Proc. Zool. Soc.* 1874, p. 89.

Caprovis polii, *Brehm, Tierleben*, ed. 3, *Säugeth*, vol. iii, p. 228, 1891.

Ovis poli typica, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 192, 1898.

Ovis ammon poli, *Lydekker, Field*, vol. cxiii, p. 117, 1909, *The Sheep and Its Cousins*, p. 282, 1912, *Cat. Hume Bequest Brit. Mus.* p. 8, 1913; *Ward, Records of Big Game*, ed. 6, p. 405, 1910.

Typical locality the Pamirs, in the neighbourhood of the Syr Daria.

Horns slender and forming a more open and outwardly extended spiral than in any of the other races; length of fine specimens 69 to 75, girth 14½ to 16, or rarely 17 inches. Coat in summer longer than in *ammon;* general colour of upper-parts light speckled brown; most or all of face,

Fig. 33.—Skull and Horns of Pamir Argali (*Ovis ammon poli*).

throat, chest, under-parts, buttocks, and legs white or whitish, the white extending largely on to outer side of thighs; a blackish streak from nape to withers; no distinct throat-ruff. In winter the hair considerably longer, forming a white ruff on throat and chest and a darkish crest from nape to withers; upper-parts with a more or less rufescent tinge, especially towards border of fawn area. In females, which have no ruff, the front of the neck is brown in winter, while in summer there is no dark stripe from nape to tail.

79. 11. 21. 20. Frontlet and horns. Pamir; collected by Lieut. Wood, R.N. Type of the race.

Transferred from India Museum, 1879.

89. 3. 9. 1. Skin, mounted. Alai Plateau, Pamir.
Presented by St. George Littledale, Esq., 1889.

89. 3. 9. 2–3. Two skins, mounted. Alai Plateau.
Same history.

91. 6. 17. 1. Skull, with horns. Karakol, Pamir.
Same donor, 1891.

91. 6. 17. 2. Skull, with horns. Karakol. *Same history.*

75. 8. 10. 1. Skull, with horns. Great Pamir.
Presented by Gen. Sir T. E. Gordon, K.C.B., 1875.

84. 6. 26. 1. Skull, with horns. Sarikol, south-east Pamir. *Presented by the Hon. Charles Ellis*, 1884.

91. 8. 7. 184. Skull, with horns, immature. South-east Pamir. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 188. Skull, with horns. Tagdumbash Valley, South-east Pamir. *Same history.*

91. 8. 7. 189. Skull, with horns. Tagdumbash.
Same history.

91. 8. 7. 191. Skull, with horns. Tagdumbash.
Same history.

91. 8. 7. 192. Skull, with horns. South-east Pamir.
Same history.

91. 8. 7. 193. Skull, with horns. Tagdumbash.
Same history.

91. 8. 7. 194. Skull, with horns. South-east Pamir.
Same history.

91. 8. 7. 195. Skull, with horns. Tagdumbash; collected by A. Dalgleish, Esq. *Same history.*

12. 10. 31. 76. Skull, with horns. Valley between Little and Great Pamir. In this head, which stands No. 17 in Ward's list, the length of the horns is $66\frac{3}{4}$, the girth $13\frac{7}{8}$, and the tip-to-tip interval $46\frac{1}{2}$ inches. The record length is 75 inches. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

12. 10. 31. 74. Skull, with horns. Same locality; collected by Mr. Dalgleish. *Same history.*

12. 10. 31. 75. Skull, with horns. Same locality; collected by Mr. Dalgleish. *Same history.*

12. 10. 31. 79. Skull, with horns (fig. 33). Same locality. *Same history.*

92. 7. 17. 2. Skin, in winter coat. Tagdumbash.
Presented by H. Lennard, Esq., 1892.

The two following names have also been applied to members of the present group:—

Ovis sculptorum, *Blyth*, *Proc. Zool. Soc.* 1840, p. 12, *Ann. Mag. Nat. Hist.* ser. 1, vol. vii, pl. v, 1841; *Brooke*, *Proc. Zool. Soc.* 1875, p. 524; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 245, 1884. Type a single horn of unknown locality in *Mus. R. Coll. Surg.*

Ovis collium, *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 154, 1873, *Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 208, 1876.

VII. OVIS CANADENSIS.

Ovis canadensis, *Shaw*, *Nat. Misc.* vol. xv, pl, 610, 1804*; *Biddulph*, *Proc. Zool. Soc.* 1885, p. 684; *Merriam*, *N. Amer. Fauna*, No. 3, p. 78, 1890, No. 5, p. 81, 1891, *Proc. Biol. Soc. Washington*, vol. xiv, p. 29, 1901; *Flower and Lydekker*, *Study of Mamm.* p. 355, 1891; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. 2, p. 137, 1891; *Liebenwalde*, *Zool. Gart.* vol. xxxv, p. 934, 1894; *Ward*, *Records of Big Game*, ed. 6, p. 391, 1910; *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 204, 1898, *Great and Small Game of Europe, etc.* p. 3, 1901, *The Sheep and Its Cousins*, p. 288, 1912; *Mearns*, *Mamm. U.S. and Mex. Boundary*, vol. i, p. 235, 1907; *Preble*, *N. Amer. Fauna*, No. 27, p. 155, 1908; *Warren*, *Mamm. Colorado*, p. 9, 1910; *Pocock*, *Proc. Zool. Soc.* 1910, p. 861; *Cary*, *N. Amer. Fauna*, No. 33, p. 62, 1911; *Miller*, *List Amer. Mamm. U.S. Mus.* p. 395, 1912.

Ovis cervina, *Desmarest*, *Nouv. Dict. Hist. Nat.* vol. xxiv, p. 5, 1804, 2nd ed. vol. xxi, p. 553, 1818; *Alston*, *Biol. Centr. Amer.—Mamm.* p. 111, 1880; *Rhoads*, *Amer. Natural*, vol. xxviii, p. 526, 1894, *Reprint of Ord's N. Amer. Zool. App.* p. 25, 1894; *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. vii, p. 258, 1895, *ibid.* vol. xxxi, p. 23, 1912; *Matschie*, *Sitzber. Ges. nat. Freunde*, 1896, p. 99; *Elliot*, *Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 46, 1901, *Check-List Mamm. N. Amer. etc.* (*Zool. Publ. Field Mus.* vol. vi) p. 53, 1905; *Stone and Cram*, *Amer. Mamm.* p. 61, 1903.

Ovis montana, *Schreber*, *Säugthiere*, pl. 294, D. 1804; *Tiedemann*, *Zoologie*, vol. i, p. 404, 1808; *Cuvier*, *Règne Anim.* vol. i, p. 267, 1817; *Richardson*, *Fauna Bor.-Amer.* vol. i, p. 271, 1829; *Jardine*, *Nat. Libr.* vol. iv, p. 142, 1836; *Baird*, *P. Red River Explor.* vol. viii, p. 673, 1857; *Blasius*, *Säugeth. Deutschl.* p. 470, 1857; *Coues*, *Proc. Ac. Nat. Sci. Philad.* 1867, p. 136; *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 153, 1873; *Coues and Yarrow*, *Rep. Wheeler Surv.* vol. v, *Zool.* p. 68, 1875; *Brooke*, *Proc. Zool. Soc.* 1875, p. 522; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 246, 1884; *Guillemard*, *Proc. Zool. Soc.* 1885, p. 677; *Brehm*, *Tierleben*, ed. 3, *Säugeth.* vol. iii, p. 231, 1891; *Hornaday*, *5th Rep. N. York Zool. Soc.* 1900, p. 101, 1901.

Ovis ammon (?), *Mitchell*, *N. York Med. Repos.* vol. x, p. 35, 1806; *Harlan*, *Fauna Amer.* p. 262, 1825, *nec* Capra ammon, *Linn.*

* *Vide* Allen, *Bull. Amer. Mus. Nat. Hist.* vol. xxi, pp. 13 and 15, 1912.

Ovis pygargus, *H. Smith*, *Griffith's Anim. Kingdom*, vol. iv, p. 318, vol. v, p. 357, 1827.

Caprovis (Argali) canadensis, *Gray*, *Cat. Ungulata Brit. Mus.* p. 176, 1852, *Cat. Ruminants Brit. Mus.* p. 57, 1872; *Gerrard*, *Cat. Bones Mamm. Brit. Mus.* p. 250, 1862.

Musimon montanus, *Gervais*, *Hist. Nat. Mamm.* vol. ii, p. 191, 1855.

Caprovis canadensis, *Gray*, *Hand-List Ruminants Brit. Mus.* p. 133, 1873.

Bighorn Sheep.

Typical locality near Calgary, Alberta.

Size large; shoulder-height in typical race about 38 inches. Horns, apart from lines of growth, comparatively smooth, with front outer angle strongly developed and inner one rounded off; curving forwards by the sides of face, and forming about one complete circle, or rather more, the tips being distinctly everted. Skull relatively short, with very prominent orbits, the lower border of which is nearly at right angles with nasal suture; lachrymal pits, like the face-glands, small. No nuchal crest or throat-ruff. General colour ranging from greyish brown, with a conspicuous white rump-patch, divided by a blackish line connecting the dark upper side of tail with dark of back in the dark forms, to blackish brown in one direction and creamy white in the other Horns of females short, ribbed at base, and inclining backwards and outwards.

In the comprehensive sense in which the name *canadensis* is here used, the range of the species extends from Mexico to the Yukon and Alaska, and thence to eastern Kamchatka and north-eastern Siberia.

The following is a tentative "key" to the local races:—

A. Size large or medium; horns massive, moderately divergent, with the tips generally blunted; ears large or medium, pointed, and moderately haired.

a. Ears medium.

a'. Size large; general colour greyish brown; tooth-row medium ..... *O. c. canadensis.*

b'. Skull smaller, with more slender horns *O. c. californiana*

c'. Skull larger, with longer tooth-row, and longer or more slender horns..... *O. c. auduboni.*

d'. Size smaller; tail shorter and sparsely haired; tooth-row short; colour pale dingy brown, or grey salmon, very dark below, with rump-patch indistinct..... *O. c. nelsoni.*

e'. Size larger, ears and tail shorter, coat thicker and greyer, and horns less distinctly triangular..... *O. c. sierræ.*

f'. General colour whitey brown, lighter than in *nelsoni* ..... *O. c. cremnobates.*

b. Ears larger.

a''. No dorsal stripe; ears 4½ in..... *O. c. mexicana.*

b''. A dorsal stripe; ears 6½ in..... *O. c. gaillardi.*

B. Size smaller, horns slender and more divergent, with the tips sharp and entire; ears small, blunt, and thickly haired.

a. Ears moderately small; skull medium in length.

a'. General colour white.

a''. Interval between paroccipital and *m.* 3, 94 mm..... *O. c. dalli.*

b''. Same interval 84 mm..... *O. c. kenaiensis.*

b'. General colour grey on back..... *O. c. fannini.*

c'. General colour blackish or black.

a''. General colour blackish brown, exclusive of rump-patch ..... *O. c. stonei.*

b''. General colour deep black..... *O. c. cowani.*

b. Ears very small and blunt; skull very short.

c. Ears very small and blunt; facial portion of skull very short.

a'. Rump-patch small; face uniformly whitish; colour slaty grey, or grey-fawn..... *O. c. nivicola.*

b'. Rump-patch larger; face with a transverse dark band; general colour light; ears slightly larger..... *O. c. borealis.*

c'. Imperfectly known ..... *O. c. alleni.*

A.—Ovis canadensis canadensis.

Ovis canadensis typica, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 209, pl. xvii, 1898, *Great and Small Game of Europe, etc.* p. 10, 1901; *Ward, Records of Big Game*, ed. 6, p. 391, 1910.

Ovis cervina cervina, *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 23, 1912

Ovis canadensis canadensis, *Miller, List Mamm. U.S. Mus.* p. 395, 1912.

Typical locality near Calgary, Alberta.

Size large (40 inches at shoulder); horns massive, moderately divergent, with the tips generally broken in adults; coat, in winter, harsh, stiff, and of moderate length; ears medium, broad, pointed, with moderately thick hair. General colour of upper-parts greyish brown of varying

intensity, tending to ashy grey on face, and darker (Vandyke brown) on hind-legs, especially the front; chest and fore portion of under-parts dark; a dark dorsal stripe; buttocks, sides of tail, hind portion of abdomen, and muzzle white or creamy yellow; hind surfaces of legs lighter than body; upper side of tail coloured like back. In summer the coat shorter, and the general colour tending to bluish grey. Fine horns measure from 40 to 44½ inches in length (occasionally more), and from 15 to 17½ in girth.

The range includes the Rocky Mountain region from Alberta and southern British Columbia to New Mexico and central Arizona; in the state of Washington westward to the mountains of Ferry, Okanagan, and Chelan counties: also the Blue Mountains of north-eastern Oregon.

* * * *. Skin, mounted. Rocky Mountains; collected by Sir John Richardson (see Biddulph, *Proc. Zool. Soc.*, 1885). *No history.*

72. 12. 12. 1. Skin, mounted. Yellowstone, Montana. *Purchased*, 1872.

59. 12. 29. 7. Skeleton (7 years old). Vancouver. *Presented by Capt. Palliser*, 1859.

59. 12. 29. 8. Skeleton (3 years old). Vancouver. *Same history.*

59. 12. 29. 9. Skeleton (2 years old). Vancouver. *Same history.*

59. 12. 29. 10. Skeleton, female. Vancouver. *Same history.*

52. 9. 18. 16. Skull, with horns. No locality. Described by Blyth, *Proc. Zool. Soc.*, 1840, p. 64; length of horns, 41 inches. *Presented by the Zoological Society*, 1852.

67. 2. 23. 4. Skull, with horns. No locality; collected by A. G. Dallas, Esq. *Purchased*, 1867.

1025, *i.* Skull, with horns. Taken from a skin. *No history.*

7. 7. 19. 1. Skull, with horns, but wanting lower jaw. British Columbia. *Presented by Major J. H. Wrigley*, 1907.

91. 9. 1. 3. Head, immature female, mounted. Upper Yellowstone, Montana. *Presented by E. S. Cameron, Esq.*, 1891.

10. 1. 21. 1. Head, mounted. British Columbia.
Presented by J. C. Cooksey, 1910.

11. 3. 28. 2. Skin. Wiggins Fork, Big Wind Valley, north-west Wyoming.
Presented by the Hon. L. O. Kay-Shuttleworth, 1911.

B.—Ovis canadensis californiana.

Ovis californianus, *Douglas*, *Zool. Journ.* vol. iv, p. 332, 1829.

Ovis californica, *Richardson*, *Fauna Bor.-Amer.* vol. i, p. 272, 1829; *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 1, p. 153, 1873.

Ovis californiana, *Blyth*, *Proc. Zool. Soc.* 1840, p. 77, *Ann. Mag. Nat. Hist.* ser. 1, vol. vii, p. 199, pl. v, 1841; *Biddulph*, *Proc. Zool. Soc.* 1885, p. 683; *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxv, p. 187, 1912.

Ovis cervina californiana, *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 25, 1912; *Grinnell*, *Univ. Calif. Zool. Pub.* vol. x, p. 150, 1912.

Ovis canadensis californiana, *Lydekker*, *The Sheep and Its Cousins*, p. 288, 1912.

Typical locality near Mount Adams, Yakima County, Washington.

Skull somewhat smaller than in *canadensis*, with horns resembling those of *stonei* more than those of *canadensis*. Horns much lighter than in *canadensis*, and about the size and general shape of those of *stonei*, though less spreading, and exhibiting the triangular cross section and flat front in a marked degree. The upper cheek-teeth are, as compared with those of *canadensis*, relatively large.

The range formerly included the Cascade Mountains of southern Washington and Oregon, as well as Mount Shasta and the hilly country to the eastward in northern California.

52. 9. 18. 5. Skull and horns. Near Mount Adams, Cascade Range; collected by D. Douglas, Esq. Type.
Purchased, 1852.

C.—Ovis canadensis auduboni.

Ovis canadensis auduboni, *Merriam*, *Proc. Biol. Soc. Washington*, vol. xiv, p. 31, 1901; *Lydekker*, *The Sheep and Its Cousins*, p. 289, 1912.

Ovis cervina auduboni, *Elliot*, *Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) *Suppl.* p. 484, 1901, *Check-List. Mamm. N. Amer. etc.* (*Zool. Publ. Field Mus.* vol. vi) p. 53, 1905; *Stone and Cram*, *Amer. Mamm.* p. 64, 1903; *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 26, 1912.

Typical locality Bad Lands between White and Cheyenne Rivers, South Dakota.

Described from the evidence of skulls and horns; the former of which are characterised, in addition to certain structural peculiarities, by their large size and the great proportionate length of the row of cheek-teeth, while the latter are stated to be longer and more slender than in the typical race.

No specimen in the collection.

D.—Ovis canadensis nelsoni.

Ovis nelsoni, *Merriam, Proc. Biol. Soc. Washington*, vol. xi, p. 218, 1897; *Hornaday, 5th Rep. N. York Zool. Soc.* 1900, p. 120, 1901; *Stone and Cram, Amer. Mamm.* p. 64, 1903; *Osgood, N. Amer. Fauna*, No. 30, p. 51, 1909.

Ovis canadensis nelsoni, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 208, 1898, *Great and Small Game of Europe, etc.* p. 10, 1901, *The Sheep and Its Cousins*, p. 290, 1912; *Stephens, Calif. Mamm.* p. 58, 1906; *Mearns, Mamm. U.S. and Mexican Bound. Surv.* vol. i, p. 245, 1907; *Ward, Records of Big Game*, ed. 6, p. 391, 1910.

Ovis cervina nelsoni, *Elliot, Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 46, 1901, *Check List Mamm. N. Amer. etc.* (*Zool. Publ. Field Mus.* vol. vi) p. 54, 1905; *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 26, 1912.

Typical locality Grapevine Mountains, on the border of southern California and Nevada.

Size small, coat short, stiff, and harsh, with a colour pattern similar to that of *stonei* (p. 120), but the tint much paler—pale dingy brown according to Merriam, pale salmon-grey according to Hornaday. Rump-patch small, completely divided by dark median line, and frequently indistinct; under-parts and limbs (except where white) much darker than back, contrasting sharply with white areas. Tail short and sparsely haired. Forehead less concave than in *canadensis*, and cheek-teeth smaller and forming a shorter row.

The range comprises the mountains of southern Nevada, of the south of California, and of the northern part of Lower California.

No specimen in the collection.

E.—Ovis canadensis sierræ.

Ovis cervina sierræ, *Grinnell, Univ. Calif. Zool. Publ.* vol. x, p. 144, 1912.

Ovis canadensis sierræ, *Lydekker, The Sheep and Its Cousins*, p. 290, 1912.

Typical locality east slope of Mount Baxter, Sierra Nevada, Inyo County, California.

Near akin to *nelsoni*, but larger, with shorter ears and tail, greyer and thicker coat, and basal section of horns approximating more to a circular than a triangular form. Compared with typical *canadensis* it differs by the rather inferior size, less heavy coat, much paler colour, and the above-mentioned horn-section.

No specimen in collection.

F.—Ovis canadensis cremnobates.

Ovis cervina cremnobates, *Elliot, Zool. Publ. Field Mus.* vol. iii, p. 239, 1903, *Mamm. Mid. Amer.* (*Zool. Publ. Field Mus.* vol. v) p. 84, 1904, *Check List Mamm. N. Amer. etc.* (*Zool. Publ. Field Mus.* vol. vi) p. 54, 1905; *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 27, 1912.

Ovis canadensis cremnobates, *Lydekker, The Sheep and Its Cousins*, p. 292, 1912.

Typical locality Mattomi, San Pedro, Martir Mountains, Lower California.

Stated to resemble *nelsoni*, but of a much lighter colour, whitey brown—the head being in some cases nearly white—a small rump-patch, which is not separated from the fawn area by a darker line, and the front of the legs nearly black, as in the under-mentioned *stonei*. Orbital width greater (20 to 25 mm.) than in *nelsoni*.

The range includes the mountainous parts of Lower California, from Satillo del Rey northward—especially on the Gulf side—nearly to the United States frontier.

1025, *c*. Skull, with horns, and skin, belonging to this or one of the allied races. California.

Presented by the Hudson Bay Company.

G.—Ovis canadensis mexicana.

Ovis mexicanus, *Merriam, Proc. Biol. Soc. Washington*, vol. xiv, p. 30, 1901; *Hornaday, 5th Rep. N. York Zool. Soc.* 1900, p. 120, 1901; *Stone and Cram, Amer. Mamm.* p. 64, 1903; *Bailey, N. Amer. Fauna*, No. 25, p. 70, 1905.

Ovis canadensis mexicanus, *Lydekker, Great and Small Game of Europe, etc.* p. 11, 1901; *Mearns, Mamm. U.S. and Mex. Bound. Surv.* vol. i, p. 232, 1907.

Ovis cervina mexicanus, *Elliot, Mamm. Mid. Amer.* (*Zool. Publ. Field Mus.* vol. v) p. 86, 1904, *Check-List Mamm. N. Amer.* (*Zool. Pub. Field Mus.* vol. vi) p. 54, 1905.

Ovis cervina mexicana, *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 26, 1912.

Ovis canadensis mexicana, *Lydekker, The Sheep and Its Cousins*, p. 289, 1912.

Typical locality region round Lake Santa Marta, Chihuahua, Mexico.

A large sheep, lighter in colour than the typical race, but with the same arrangement of tints; ears much larger, tail slightly longer, and cheek-teeth larger. General colour drab-brown, without dorsal stripe; rump-patch relatively broad; throat, legs, and tail darker than back; chin and inner and hind surfaces of hind-legs white. General colour said to be intermediate between that of *canadensis* and *nelsoni*. Skull with frontal region less concave, and horns longer and less massive than in former.

The range includes the mountains of northern Chihuahua, the extreme west of Texas, southern New Mexico, and the south of Arizona.

2. 8. 72. 1. Skull, with horns, and skin. Chihuahua, Mexico. *Purchased*, 1902.

H.—Ovis canadensis gaillardi.

Ovis canadensis gaillardi, *Mearns, Mamm. U.S. and Mexican Bound. Surv.* vol. i, p. 240, 1907; *Lydekker, The Sheep and Its Cousins*, p. 291, 1912.

Ovis cervina gaillardi, *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 27, 1912.

Typical locality Gila Mountains between Tinajas Altas and the Mexican boundary line in Yuma County, Arizona.

Allied to *mexicana*, but with the ears still longer

(6½ inches). Compared with *canadensis*, the horns are lighter, less curved outwards, and smoother, with a less pronounced front outer angle; orbit less prominent, with the frontal region between them less concave; nasals flatter; and the row of cheek-teeth longer (3⅝ inches) in the undermentioned specimen against 3⅛ inches in a larger skull of typical *canadensis*. The type specimen is a female, which is stated to differ from *mexicana* and *nelsoni* by its inferior

FIG. 34.—HEAD OF SONORAN BIGHORN (*Ovis canadensis gaillardi*).
From a photograph by Messrs. Dracopoli.

size and smaller feet, as well as by the absence of a white muzzle and a dark dorsal stripe.

The range includes the mountains of north-western Sonora and south-western Arizona.

12. 5. 14. 1. Head, mounted (fig. 34). Pinacate Mountains, north-western Sonora.

Presented by Messrs. I. N. and J. Dracopoli, 1912.

*

I.—Ovis canadensis dalli.

Ovis montana dalli, *Nelson, Proc. U.S. Nat. Mus.* vol. vii, p. 13, 1884.

Ovis dalli, *Allen, Bull. Amer. Mus. Nat. Hist.* vol. ix, p. 112, 1897, vol. xii, p. 3, 1899; *Merriam, Proc. Biol. Soc. Washington*, vol. xi, p. 217, 1897; *Nelson, Nation. Geographic Mag.* vol. ix, p. 128, 1898; *Preble, N. Amer. Fauna*, No. 27, p. 157, 1898; *Stone, Bull. Amer. Mus. Nat. Hist.* vol. xiii, p. 43, 1900; *Hornaday, 5th Rep. N. York Zool. Soc.* 1900, p. 80, 1901; *Stone and Cram, Amer. Mamm.* p. 64, 1903; *Osgood, N. Amer. Fauna*, No. 30, p. 51, 1909.

Ovis canadensis dalli, *Nelson and True, Nat. Hist. Collect. Alaska*, p. 282, 1887; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 219, 1898, *Great and Small Game of Europe, etc.* p. 15, 1901, *The Sheep and Its Cousins*, p. 294, 1912; *McConnell, Ottawa Natural.* vol. vi, p. 131, 1892; *Ward, Records of Big Game*, ed. 6, p. 394, 1912.

Ovis cervina dalli, *Elliot, Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 47, 1901, *Check-List. Mamm. N. Amer. etc.* (*Zool. Publ. Field Mus.* vol. vi) p. 55, 1905.

Ovis dalli dalli, *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 27, 1912.

Typical locality near Fort Reliance, Yukon; the range extending over a great part of Alaska and Yukon, and south-eastwards to the Mackenzie Mountains.

Size rather smaller than in typical *canadensis* (39 inches at shoulder) and build lighter; horns more slender and divergent, with the tip sharp, and the front angles so pronounced as to produce a groove beneath them on the lateral surfaces, colour amber-yellow; coat softer and longer than in *canadensis;* ears short, bluish, and thickly haired; skull markedly shorter than in typical race. General colour uniformly creamy white. Good horns measure from 38 to 49 inches, with a girth of from 12½ to 14½ inches.

99. 2. 22. 1. Skin, mounted. Alaska.
Presented by J. Tatchell Studley, Esq., 1899.

99. 2. 24. 2. Skin, female, mounted. Alaska.
Same history.

10. 5. 31. 1. Head, mounted. Alaska.
Presented by Staff-Surgeon C. N. Rickard, R.N., 1910

5. 10. 18. 2. Skin. Yukon Territory.
Presented by H.H. Prince Coloredo Mansfeld, 1905.

10. 3. 16. 1. Skull, with horns, and skin. Klondike; collected by H. Pinkiert. *Purchased*, 1910.

4. 9. 18. 3. Skull, female, with one horn and without lower jaw, referable to this or one of the allied races. Alaska.
Presented by Capt. C. E. Radcliffe, 1904.

J.—Ovis canadensis kenaiensis.

Ovis dalli kenaiensis, *Allen*, *Bull. Amer. Mus. Nat. Hist.* xvi, pp. 145, 219, 1902, vol. xxxvii, p. 28, 1912.

Typical locality Kenai Peninsula, Alaska.

Distinguished from *dalli* by the shorter posterior nares in the skull, and the consequent approximation of the mastoid process to the last molar; the interval between the two being 94 mm. against 84 mm. in *dalli*. Correlated with this is a difference in the angle made by the basioccipital axis with the palatal axis. The cheek-teeth are stated to be larger, and the tooth row more curved.

The distributional area is stated to be completely isolated from that of *dalli*.

No specimen in the collection.

K.—Ovis canadensis fannini.

Ovis fannini, *Hornaday*, *5th Rep. N. York Zool. Soc.* 1900, p. 78, 1901; *Osgood*, *N. Amer. Fauna*, no. 30, p. 51, 1909.

Ovis canadensis fannini, *Lydekker*, *Great and Small Game of Europe, etc.* p. 19, 1901, *The Sheep and Its Cousins*, p. 294, 1912; *Ward*, *Records of Big Game*, ed. 6, p. 394, 1912.

Ovis dalli fannini, *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 28, 1912.

Typical locality near Dawson City, Yukon.

General characters those of *dalli*, but a large portion of the upper-parts brownish grey, conveying "the appearance of a white animal covered with a grey blanket." Tail darker than back.

The range is mainly comprised between 58° and 64° North latitude, and between 129° and 135° West longitude; in British Columbia and Yukon this race merges into *dalli* to the north and into *stonei* to the south.*

5. 10. 18. 1. Skin, mounted. Yukon Territory.
Presented by H.H. Prince Coloredo Mansfeld, 1905.

5. 10. 18. 2. Head, mounted, female. Yukon Territory.
Same history.

* Sheldon, *The Wilderness of the Upper Yukon*, New York, 1911.

L.—Ovis canadensis stonei.

Ovis stonei, *Allen*, *Bull. Amer. Nat. Hist.* vol. ix, p. 111, pls. ii, iii, 1897, *ibid.* vol. xii, p. 2, 1899; *Nelson*, *Nation. Geogr. Mag.* vol. ix, p. 128, 1898; *Stone*, *Bull. Amer. Mus. Nat. Hist.* vol. xiii, p. 42, 1900; *Hornaday*, *5th Rep. N. York Zool. Soc.* 1900, p. 97, 1901; *Stone and Cram*, *Amer. Mamm.* p. 64, 1903; *Preble*, *N. Amer. Fauna*, No. 27, p. 156, 1908.

Ovis canadensis stonei, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 217, 1898, *Great and Small Game of Europe, etc.* p. 12, 1901, *The Sheep and Its Cousins*, p. 294, 1912; *Ward*, *Records of Big Game*, ed. 6, p. 395, 1910.

(?) Ovis liardensis, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 215, fig. 41, 1898.

Ovis dalli stonei, *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xxxi, p. 28, 1912.

Typical locality Chioni Mountains, northern British Columbia.

Closely allied to *dalli*, but the horns rather more divergent, the coat shorter and more compact, and the general colour, when adult, some shade of greyish or blackish brown, with, in the lighter phases, a full black dorsal stripe, extending to the tip of the tail. Face greyish; rump-patch, hind portion of lower surface of body, and parts of hind surface of legs white.

The range includes northern British Columbia, eastward of long. 130° W.; further north this race passes imperceptibly into *fannini*.

52. 5. 9. 2. Skin, mounted. Liard Valley, Canada. Type of *liardensis*, but apparently not really separable from present race. *Presented by Dr. J. Rae*, 1852.

5. 11. 23. 1. Skin, mounted. Stichin Valley. *Presented by David T. Hanbury, Esq.*, 1905.

M.—Ovis canadensis cowani.

Ovis cowani, *Rothschild*, *Proc. Zool. Soc.* 1907, p. 238.

Typical locality Mt. Neve, Logan, British Columbia.

Stated to differ from *stonei* in being wholly deep black above, with the exception of the white rump-patch, which is smaller, and the grey face.

No specimen in collection.

N.—Ovis canadensis nivicola.

Ovis nivicola, *Eschscholtz, Zool. Atlas*, p. i, pl. i, 1829; *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, pp. 86, 153, 1873, *Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 208, 1876; *Brooke, Proc. Zool. Soc.* 1875, p. 521; *Guillemard, ibid.* 1885, p. 675; *Biddulph, ibid.* p. 679; *Ward, Records of Big Game*, p. 249, 1896.

Ovis montanus, *Middendorff, Reise Zool.* p. 116, 1851, nec *Schreber.*

Ovis canadensis nivicola, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 221, pl. xxii A, *The Sheep and Its Cousins*, p. 297, 1912; *Ward, Records of Big Game*, ed. 6, p. 396, 1912.

Typical locality eastern Kamchatka.

General characters very similar to those of *dalli* and *stonei*, but ears still shorter, blunter, and more thickly haired, a shorter face, longer coat, and relatively small rump-patch; general colour slaty grey, or grey-fawn. Good horns measure from 34 to 39¼ inches in length, and from 13½ to 14½ in girth.

83. 2. 10. 2. Skin, mounted. Near Petropaulski, Kamchatka; collected by Dr. Dybowski. Also skull of same specimen. *Purchased*, 1883.

1. 11. 22. 3. Skin, mounted (winter coat). Kamchatka. *Presented by St. George Littledale, Esq.*, 1901.

1. 11. 22. 4. Skull, with horns. Kamchatka. *Same history.*

1. 11. 22. 5. Skull, with horns. Kamchatka. *Same history.*

1. 11. 22. 6. Skull, with horns, female. Kamchatka. *Same history.*

88. 2. 20. 19. Skull, with horns. Kamchatka. *By exchange with St. Petersburg Museum*, 1888.

88. 2. 20. 20. Skull, with horns. Kamchatka. *Same history.*

0. 10. 16. 4. Skin. Kamchatka. *Presented by St. George Littledale, Esq.*, 1900.

O.—Ovis canadensis borealis.

Ovis borealis, *Severtzow, Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 153, 1873; *Peters, Monatsber. Ak. Berlin*, 1876, p. 180; *Bunge and Toll, Exped. Neusibir. Inseln und Jena-Lande*, p. 34, 1886; *Nehring, Tundren und Steppen*, p. 36, 1890; *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xx, p. 293, 1904; *Matschie, Appendix to P. Niedieck's Kreuzfahrten im Beringmeer*, p. 236, 1907.

Ovis canadensis borealis, *Lydekker*, *Proc. Zool. Soc.* 1902, vol. ii, p. 84, pl. viii, *The Sheep and Its Cousins*, p. 298, 1912; *Ward*, *Records of Big Game*, ed. 6, p. 397, 1910.

Typical locality apparently Verkhoyansk Mountains, between Yana and Lena Valleys; Matschie gives Byrranga Mountains, south of Taimyr Peninsula, between Lena and Yenisei Valleys.

Closely related to last, but ears, which are very thickly haired, rather larger, as is also the rump-patch, although this does not include the short, bushy tail, or extend on the buttocks above the line of its root; general colour lighter; face white, with a broad wood-brown transverse band between eyes and nostrils, spreading on to cheeks; nape white mingled with grey; a faint dorsal stripe, becoming more pronounced as it approaches the blackish brown tail. Rather more white on under-parts and legs than in *nivicola*.

2. 4. 26. 2. Skin, mounted. Yana Valley. Figured by present writer, *Proc. Zool. Soc.*, *loc. cit.*

Presented by J. Talbot Clifton, Esq., 1902.

91. 6. 29. 8. Skull, with horns. Stanovoi Mountains, East Siberia; collected by Messrs. Dörries. *Purchased*, 1891.

P.—Ovis canadensis alleni.

Ovis alleni, *Matschie, in Niedieck's Kreuzfahrten im Beringmeer*, p. 236, 1907, *English Translation*, p. 226, 1909; typified by head figured by Allen, *Bull. Amer. Mus. Nat. Hist.* vol. xx, p. 295, fig. 3.

Typical locality Taiganos Peninsula.

Named on the supposition that, on geographical grounds, it may prove distinct from *borealis*.

No specimen in collection.

II. Genus AMMOTRAGUS.

Ammotragus, *Blyth*, *Proc. Zool. Soc.* 1840, p. 13; *Gray*, *Cat. Ungulata Brit. Mus.* p. 179, 1852; *Rütimeyer*, *Abh. schweiz. pal. Ges.* vol. iv, p. 101, 1877; *Pocock*, *Proc. Zool. Soc.* 1910, p. 862.

Horns "perverted" homonymous, curving backwards over neck, and marked with strong transverse wrinkles, especially when immature, those of females larger than in

Ovis. Two teats; tail relatively long, reaching nearly to hocks, with long hairs on terminal half. No face-glands or foot-glands. No beard; males not malodorous. Skull without lachrymal pits. Vertebræ: C. 7, D. 13, L. 6, S. 4, ca. 14.

Restricted to North Africa.

AMMOTRAGUS LERVIA.

Antilope lervia, *Pallas*, *Spicil. Zool.* fasc. xii, p. 12, 1777.

Ovis tragelaphus, *Cuvier*, *Règne Animal*, vol. i, p. 268, 1817; *Desmarest*, *Mammalogie*, vol. ii, p. 486, 1822; *H. Smith*, *Griffith's Animal Kingdom*, vol. iv, p. 319, v, p. 359, 1827; *Gray*, *List Mamm. Brit. Mus.* p. 169, 1843; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 248, 1884; *Lataste*, *Act. Soc. Linn. Bordeaux*, vol. xxxix, p. 288, 1885; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 141, 1891; *Flower and Lydekker*, *Study of Mammals*, p. 354, 1891; *Ward*, *Records of Big Game*, p. 257, 1896.

Ovis (Ammotragus) tragelaphus, *Blyth*, *Proc. Zool. Soc.* 1840, pp. 13 and 76.

Ammotragus tragelaphus, *Gray*, *Knowsley Menagerie*, vol. ii, p. 40, 1850, *Cat. Ungulata Brit. Mus.* p. 179, 1852, *Cat. Ruminants Brit. Mus.* p. 134, 1872, *Hand-List Ruminants Brit. Mus.* p. 134, 1873; *Gerrard*, *Cat. Bones Mamm. Brit. Mus.* p. 252, 1862.

Musimon tragelaphus, *Gervais*, *Hist. Nat. Mamm.* p. 192, 1853.

Ægoceros tragelaphus, *Heuglin*, *Petermann's Mitt.* 1861, p. 16.

Aries tragelaphus, *Lataste*, *Explor. Scient. Tunisie*, *Mamm.* p. 35, 1887.

Ovis (Ammotragus) lervia, *Lydekker*, *Wild Oxen*, *Sheep. and Goats*, p. 226, 1898, *Game Animals of Africa*, p. 86, 1908.

Ovis lervia, *Anderson and de Winton*, *Zool. Egypt*, *Mamm.* p. 334, 1902; *Ward*, *Records of Big Game*, ed. 6, p. 389, 1910; *Rothschild*, *Novit. Zool.* vol. xx, pt. 2, 1913.

Ammotragus lervia, *Thomas*, *Proc. Zool. Soc.* 1902, vol. ii, p. 13; *Pocock*, *Proc. Zool. Soc.* 1910, p. 862; *Lydekker*, *The Sheep and Its Cousins*, p. 302, 1912.

ARUI: BARBARY SHEEP.

Typical locality Mauretania.

Size comparatively large; shoulder-height about 39 inches. Head relatively long and narrow, with rather large ears; a short upright mane from neck to middle of back; long hair developed on throat, sides of body and limbs. Tips of horns directed inwards, or inwards and downwards. General colour of head, upper-parts, and outer side of limbs uniform rufous or greyish brown, rather darker on mane; inside of ears, chin, middle line of under-parts, and inner surface of

upper segment of limbs whitish; a few dark bars on throat. Horns yellowish brown, darkening with age. Good horns measure from 20 to 28½ inches in length, and from 10½ to 11½ in girth.

The range extends from the Atlas to the Egyptian Sudan, its southern limits including the desert south of Biskra and the mountains in the neighbourhood of Khartum.

The four geographical races may be briefly diagnosed as follows:—

A. Horns scarcely, if at all, depressed; an indistinct dark median face-stripe ..... *A. lervia lervia.*

B. Horns markedly depressed; no face-stripe.

a. General colour brownish grey; beard blackish..... *A. lervia blainei.*

b. General colour sandy rufous.

b'. General colour warm sandy rufous; no whitish subauricular patch.... *A. lervia ornata.*

c'. General colour pale sandy rufous; a white subauricular patch ..... *A. lervia sahariensis.*

A.—Ammotragus lervia lervia.

Ovis lervia lervia, *Rothschild, Novit. Zool.* vol. xx, pt. 2, 1913.

Typical locality Mauretania.

Horns scarcely, if at all, depressed; an indistinct dark median face-stripe.

The distributional area includes a large portion of Algeria.

50. 11. 22. 3. Skin, mounted. North Africa. *Presented by the Zoological Society*, 1850.

50. 12. 2. 20. Skeleton, wanting skull, associated with preceding. *Same history.*

48. 8. 21. 129. Skin, immature. Menagerie specimen. *Presented by J. Baker, Esq.*, 1848.

54. 12. 6. 3. Skin, immature. Menagerie specimen. *Presented by the Zoological Society*, 1854.

95. 6. 7. 1. Skin, mounted. Amarkadu Mountains, near Biskra, Algerian Sahara. *Presented by Sir E. G. Loder, Bart.*, 1895.

2. 11. 4. 82. Skull, with horns, and skin. Wadi Agarib, Tripoli. *Presented by J. I. S. Whitaker, Esq.*, 1902.

95. 7. 10. 54. Immature female skin. Ecru.
Same donor, 1895.

98. 7. 4. 35. A similar specimen. Morocco.
Same donor, 1898.

56. 12. 30. 1. Skeleton. Menagerie specimen.
Presented by the Zoological Society, 1856.

58. 1. 12. 3. Skeleton, mounted. Menagerie specimen.
Same donor, 1858.

66. 12. 30. 17. Immature skeleton. Menagerie specimen.
Same donor, 1866.

96. 12. 15. 1. Frontlet, with horns. Amarkadu Mountains, near Biskra. *Presented by the Hon. A. Ward*, 1896.

46. 10. 30. 175. Horns, female. Djered, Tunisia; collected by L. Fraser, Esq. *Purchased*, 1846.

669, *a*. Horns. No locality. *No history.*

669, *b*. Horns. No locality. *No history.*

669, *j*. *k*. Two pairs of horns. No locality. *No history.*

669, *c*. *d*. Two pairs of horns, female. No locality.
No history.

B.—Ammotragus lervia sahariensis.

Ovis lervia sahariensis, *Rothschild*, *Novit. Zool.* vol. xx, pt. 2, 1913.

Typical locality Oued Mya, west-central Sahara.

Horns strongly depressed, turning sharply downwards before bending backwards; general colour pale rufous sandy, with a whitish patch below and somewhat behind each ear, but no face-stripe.

Type in Tring Museum. No specimen in the collection.

C.—Ammotragus lervia ornata.

Ovis ornata, I. *Geoffroy*, *Descrip. Égypte*, *Hist. Nat.* vol. ii, p. 742, pl. vii, 1833.

Ovis lervia ornata, *Rothschild*, *Novit. Zool.* vol. xx, pt. 2, 1913.

Typical locality Cairo.

Nearly allied to *sahariensis*, but deeper rufous in colour, and without subauricular light patches.

The distributional area includes the Red Sea littoral, to which this race seems to be now restricted.

No specimen in the collection.

D.—Ammotragus lervia blainei.

Ovis lervia blainei, *Rothschild*, *Novit. Zool.* vol. xx, pt. 2, 1913.

Typical locality border of Dongola and Kordofan.

Horns strongly depressed, but less bent backwards than in other races; general colour brownish grey, less rufous than in other races; sides of head, face, and mask much darker owing to admixture of blackish hairs; beard on sides of lower jaw nearly black; no subauricular light spot.

Type in collection of G. Blaine, Esq.

95. 6. 8. 1. Skull, with horns. Nile Valley, above Wadi Halfa; collected by Capt. Dunning. *Purchased*, 1895.

III. Genus PSEUDOÏS.

Pseudois, *Hodgson*, *Journ. Asiat. Soc. Bengal*, vol. xv, p. 343, 1846; *Gray*, *Cat. Ungulata Brit. Mus.* p. 177, 1852; *Lydekker*, *Journ. Asiat. Soc. Bengal*, vol. xlix, p. 131, 1880, *The Sheep and Its Cousins*, p. 305, 1912; *Pousargues*, *Mém. Soc. Zool. France*, 1898, p. 158; *Pocock*, *Proc. Zool. Soc.* 1910, p. 863.

Horns "perverted" homonymous, curving backwards over neck, and, except for lines of growth, smooth, those of females small and spear-like. Two teats; tail rather longer than in *Ovis* with long hairs. Face-glands absent, but their position marked by a small patch of bare skin; foot-glands absent, or represented by small rudiments. No beard; males not malodorous. Skull without lachrymal pits. Vertebræ: C. 7, D. 13, L. 6, S. 4, Ca. 10.

The genus is intimately connected with the goats by means of *Capra cylindricornis*.

Restricted to the highlands of Central Asia.

PSEUDOÏS NAHOOR.

Ovis nayaur, *Hodgson*, *Asiat. Research*, vol. xviii, pt. 2, p. 135, 1833, *in part*; *Matschie*, *SB. Ges. nat. Freunde*, 1896, p. 97, 1897, p. 72; name misprinted, subsequently corrected by author.

Ovis nahoor, *Hodgson*, *Proc. Zool. Soc.* 1834, p. 107, *Journ. Asiat. Soc. Bengal*, vol. x, pp. 231, 293, 1840, xi, p. 283, 1842, *Sclater*, *Proc. Zool. Soc.* 1860, p. 129; *Kinloch*, *Large Game Shooting*, pt. 1, p. 25, 1866; *Milne-Edwards*, *Rech. Mamm.* p. 357, pls. lxviii and lxix, 1868–74; *Severtzow*, *Trans. Soc. Nat. Moscow*,

vol. viii, art. 2, p. 153, 1873; *Rütimeyer*, *Abh. schweiz. pal. Ges.* vol. iv, p. 182, 1877; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 247, 1884; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 140, 1891.

Ovis burrhel, *Blyth*, *Proc. Zool. Soc.* 1840, p. 67, *Ann. Mag. Nat. Hist.* ser. 1, vol. vii, p. 248, 1841, *Journ. Asiat. Soc. Bengal*, vol. x, p. 868, 1841; *Severtzow*, *Trans. Soc. Nat. Moscow*, vol. viii, art. 2, p. 153, 1873.

Ovis nahura, *Gray*, *List Mamm. Brit. Mus.* p. 170, 1843; *Jerdon*, *Mamm. India*, p. 296, 1867; *Blanford*, *Journ. Asiat. Soc. Bengal*, vol. xli, p. 40, 1872, *Scient. Results*, 2nd *Yarkand Miss.* —*Mamm.* p. 85, pl. xiv, 1879, *Fauna Brit. India*, *Mamm.* p. 499, 1891; *Sterndale*, *Mamm. India*, p. 438, 1884; *Flower and Lydekker*, *Study of Mammals*, p. 354, 1891; *Ward*, *Records of Big Game*, ed. 6, p. 387, 1910.

Pseudois nahoor, *Hodgson*, *Journ. Asiat. Soc. Bengal*, vol. xv, p. 343, 1846, xvi, p. 702, 1847; *Horsfield*, *Cat. E. Ind. Mus.* p. 176, 1851; *Gray*, *Cat. Ungulata Brit. Mus.* p. 177, 1852. *Cat. Ruminants Brit. Mus.* p. 133, 1872, *Hand-List Ruminants Brit. Mus.* p. 133, 1873; *Adams*, *Proc. Zool. Soc.* 1858, p. 527; *Gerrard*, *Cat. Bones Mamm. Brit. Mus.* p. 252, 1862; *Przewalski*, *Reis. Mongolie*, p. 219, 1875, *Cat. Zool. Collect.* p. 16, 1887; *Lydekker*, *Journ. Asiat. Soc. Bengal*, vol. xlix, p. 131, 1880, *Cat. Hume Bequest*, *Brit. Mus.* p. 11, 1913; *Pousargues*, *Mém. Zool. Soc. France*, 1898, p. 156.

Musimon nahoor, *Gervais*, *Hist. Nat. Mamm.* vol. ii, p. 191, 1855.

Pseudois burrhel, *Przewalski*, *Cat. Zool. Coll.* p. 16, 1887.

Ovis (Pseudoïs) nahura, *Lydekker*, *Wild Oxen*, *Sheep*, *and Goats*, p. 231, 1898, *Game Animals of India*, *etc.* p. 105, 1907.

Pseudoïs nahura, *Nathusius*, *Zool. Anzeig.* 1888, p. 333; *Langkavel*, *Zool. Garten*, vol. xxx, p. 298, 1889; *Lydekker*, *The Sheep and Its Cousins*, p. 305, 1912.

Pseudois nayaur, *Pocock*, *Proc. Zool. Soc.* 1910, p. 863.

BHARAL.

Typical locality the Tibetan frontier of Nepal.

Size medium; shoulder-height about 36 inches. Head long and narrow, with small ears; hair of uniform length throughout. Horns rounded or subtriangular at base, marked with lines of growth and fine striæ, the tips, which are situated over the withers, inclined inwards and slightly upwards. General colour of head and upper-parts brownish grey, suffused with slaty blue, browner in summer, and more distinctly slaty grey, washed with brown, in winter; under-parts, inner and hind surfaces of legs, and buttocks as far as root of tail white; in adults the face, chest, a stripe down front of legs, except on knees, which are white, a flank-band, and terminal two-thirds of tail black. In females the black on

face, chest, and flanks wanting. Colour of horns blackish olive. Good horns measure from 26 to 32 inches in length, and from 10¼ to 12½, or occasionally 13½ in girth.

The distributional area extends from Hunza and Nagar, through the Shigar district of Baltistan, Garhwal, and Tibet, to Sze-chuan, Shen-si, and Kan-su. The Kan-su and Shen-si bharal may represent a distinct race.

43. 1. 26. 12. } Skull, imperfect, with horns, and skin,
43. 1. 12. 122. } female. Nepal frontier. Type.
Presented by B. H. Hodgson, Esq., 1843.

57. 7. 29. 3. Skin, mounted. No locality; mentioned *Proc. Zool. Soc.* 1838, p. 80.
Presented by the Linnean Society, 1857.

79. 11. 21. 658. Skin, mounted. Kumaon; collected by Gen. Strachey. *Transferred from India Museum*, 1879.

79. 11. 21. 659. Skin, mounted, female. Same locality and collector. *Same history.*

103, *c*. Skin, mounted, female. Locality unknown.
No history.

668, *u*. Skull, with horns, and skin. Barinda Pass, near Jamnotri, east of Simla; collected by Lieut. E. Smith, 1836. Type of *O. burrhel;* see *Proc. Zool. Soc.* 1838, p. 78, 1840, p. 67. *Presented by the Zoological Society.*

97. 5. 10 1. Skin, mounted. Ladak. *Purchased*, 1897.

45. 1. 12. 526. Skeleton, imperfect. Nepal frontier.
Presented by B. H. Hodgson, Esq., 1845.

45. 1. 8. 152. Skull, with horns. Nepal frontier.
Same history.

43. 1. 12. 109. Odd horns. Nepal frontier.
Same donor, 1843.

58. 6. 24. 27. Skull, with horns, immature. Sikhim.
Same donor, 1858.

56. 5. 6. 74. Skull, with horns. Sikhim.
Presented by Dr. T. Oldham, 1856.

79. 11. 21. 25. Skull, with horns. No locality.
Transferred from India Museum, 1879.

55. 1. 20. 8. Skull, with horns, and skin, female. Nepal. *Presented by H.H. Maharaja Dhuleep Singh*, 1855.

56. 9. 22. 13. Skull, female. Himalaya; collected by Gen. Abbott. *Purchased*, 1856.

88. 3. 20. 1. Skull, with horns. Skieu Valley, Ladak.
Presented by R. Lydekker, Esq., 1888.

8. 2. 29. 3. Skull, with horns. Niti, Garhwal.
Presented by Dr. T. G. Longstaff, 1908.

11. 11. 1. 9. Skull, with horns, and skin. Shen-si, China; collected by Dr. J. A. C. Smith.
Presented by the Hon. Walter Rothschild, 1911.

94. 2. 8. 4. Skull, with horns, and skin, female. Mountains east of Koko Nor.
Presented by St. George Littledale, Esq., 1894.

91. 8. 7. 196. Skull, with horns. Near Leh.
Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 197. Skull, with horns. Spiti. *Same history.*

91. 8. 7. 198. Skull, with horns. Garhwal.
Same history.

91. 8. 7. 199. Skull, with horns. Rupshu.
Same history.

9. 8. 7. 200. Skull, with horns. Near Leh.
Same history.

12. 10. 31. 77. Skull, with horns. Garhwal. This specimen stands No. 3 in Ward's list. Length of horns $30\frac{7}{8}$, girth $12\frac{1}{4}$, tip-to-tip interval $21\frac{7}{8}$ inches. The record horn-length is $32\frac{1}{2}$ inches.
Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 78. Skull and horns. Garhwal.
Same history.

IV. Genus CAPRA.

Capra, *Linn. Syst. Nat.* ed. 10, vol. i, p. 68, 1758, ed. 12, vol. i, p. 94, 1766; *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 300, vol. v, p. 356, 1827; *Pousargues, Mém. Soc. Zool. France*, 1898, p. 158; *Pocock, Proc. Zool. Soc.* 1910, p. 864; *Miller, Cat. Mamm. W. Europe Brit. Mus.* p. 988, 1912.

Hircus, *Boddaert, Elenchus Animal.* p. 147, 1785; *Gray, Cat. Ungulata Brit. Mus.* p. 153, 1852.

Aries, *Link, Zool. Beyträge*, vol. i, pt. 2, p. 96, 1795.

Tragus, *Schrank, Fauna Boica*, vol. i, p. 80, 1798.

Ægoceros, *Pallas, Zoogr. Rosso-Asiat.* vol. i, p. 224, 1811.

Ibex, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xvi, p. 700, 1847; *Gray, List Osteol. Brit. Mus.* p. 59, 1847.

Ægoceros, *Gray, Cat. Ungulata Brit. Mus.* p. 148, 1852, *Cat. Ruminants Brit. Mus.* p. 52, 1872, nec *Pallas.*

Orthagoceros, *Trouessart, Cat. Mamm. Suppl.* p. 738, 1905.

Horns large and, in wild species, usually heteronymous, but in some instances "perverted" homonymous; those of the former type either scimetar-like, with more or less pronounced knots or knobs on front angle or surface or spiral; in females smaller and smooth. Tail much as in *Pseudoïs*. Face-glands wanting; foot-glands sometimes present in fore-feet of Indian domesticated breeds, always absent in hind-feet; * two teats. A beard on chin in males, which are strongly odorous. Skull without lachrymal pits; markedly convex in profile, with upper end of premaxilla wedged in between nasal and maxilla. Terminal and median vertical ridges on outer side of upper premolars obsolete. Vertebræ: C. 7, D. 13, L. 6, S. 4, Ca. 9–13.

The distributional area of the genus comprises the mountainous districts of many of the Mediterranean countries, namely, Portugal, Spain, Switzerland, northern Italy, the islands of the Grecian Archipelago, and north-eastern Africa, whence it extends eastwards through the Caucasus, Asia Minor, Arabia, Persia, Sind, and Baluchistan to Central Asia.

The genus is closely connected with *Pseudoïs* by means of *C. caucasica cylindricornis*.

The following is a provisional key to the species here recognised:—

A. Horns "perverted" homonymous, forming a double curve, with the extreme tips turning upwards.
  a. Horns devoid of prominent knots and more or less bharal-like; beard short and curling ..... *C. caucasica*.
  b. Horns compressed, marked with irregular transverse ridges, and forming a long open spiral; beard long and straight ..... *C. pyrenaica*.

B. Horns heteronymous, more or less scimetar-like, and knotted or knobbed in front, with the tips turning downwards; beard long and restricted to chin.
  a. A bony boss on forehead ..... *C. walie*.
  b. No boss on forehead.
    a'. Horns imperfectly scimetar-like; when knobs fully developed, short ..... *C. severtzowi*.
    b'. Horns distinctly scimeter-like.
      a''. Front surface of horns broad.
        a^3. Beard moderate; general colour uniform; horns moderate ..... *C. ibex*.

* Not verified in all the species.

b^3. Beard longer; back frequently with light saddle: horns very large, with very broad front surface ..... *C. sibirica.*

b''. Front surface of horns narrower..... *C. nubiana.*

c''. Front surface of horns forming a sharp ridge..... *C. hircus.*

c. Horns forming a corkscrew-like or screw-like heteronymous spiral, with the tips everted; beard forming a fringe on throat and chest ..... *C. falconeri.*

I. CAPRA CAUCASICA.

Capra caucasica, *Güldenstädt, in Pallas, Acta Ac. Petrop.* vol. iii, pt. 2, p. 273, 1779.

The synonomy is given under the heading of the local races of this and the next species.

Typical locality Central Caucasus in the neighbourhood of Malka and Backsan, to the east of Mount Elbruz.

A heavily built goat, with more or less bharal-like horns of the "perverted" homonymous type, and a short curling beard. The horns are generally marked only by irregular transverse lines, but in the typical race may show slight knots on the front surface; they have a double curve, and the tips are directed inwards and upwards.

A.—Capra caucasica cylindricornis.

Ovis cylindricornis, *Blyth, Proc. Zool. Soc.* 1840, p. 68.

Ægoceros pallasi, *Rouiller, Bull. Soc. Moscow*, vol. xiv, p. 908, pl. xi, 1841.

Capra caucasica, *Keyserling and Blasius, Wirbelth. Europ.* p. 28, 1840; *Blasius, Säugeth. Deutschl.* p. 479, 1857; *Sclater, Proc. Zool. Soc.* 1886, p. 315.

Ovis pallasi, *Reichenbach, Naturgeschichte Wiederkäuer*, pl. xlix, 1846.

Ægoceros caucasica, *Gray, Cat. Ungulata Brit. Mus.* p. 148, 1852.

Capra pallasi, *Radde, Proc. Zool. Soc.* 1887, p. 553; *Ward, Records of Big Game*, p. 235, 1896.

Capra cylindricornis, *Büchner, Mém. Ac. Sci. St. Pétersb.* vol. xxxv. No. 8, p. 21, 1887; *Menzbier, Proc. Zool. Soc.* 1887, p. 618 *Satunin, Zool. Jahrb. Abt. für Syst.* vol. ix, p. 312, 1896; *Ward, Records of Big Game*, p. 235, 1896, ed. 6, p. 385, 1910; *Pousargues, Mém. Soc. Zool. France*, 1898, p. 159; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 242, pl. xx, 1898, *Great and Small Game of Europe, etc.* p. 141, 1901, *Field*, vol. cxiii, p. 379, 1909; *Dinnik, Zool. Beob.* vol. xlix, p. 336, 1908; *Trouessart, Faune Mamm. Europe*, p. 241, 1910; *Pocock, Proc. Zool. Soc.* 1910, p. 866.

Eastern Tur.

Typical locality Eastern Caucasus, probably the neighbourhood of Kasbeg, whence the range extends, in an elliptical area, to Daghestan.

Horns of the general type of *Pseudoïs nahoor*, but more massive; their section subtriangular, with a rounded front surface, and their direction at first upwards and outwards, then backwards and downwards, and finally inwards and upwards. General colour in winter reddish or chestnut-brown, with a more or less defined dark dorsal stripe; tail blackish brown above, whitish inferiorly; groin and inner sides of thighs dirty white; chest and front surfaces of legs

Fig. 35.—Head of Pallas's Caucasian Tur (*Capra caucasica cylindricornis*).
From Ward's *Records of Big Game*.

blackish brown. Summer coat, except on the dark areas, rather lighter, with a tendency to greyish. Shoulder-height about 36 inches. Fine horns measure from 36 to 46 inches in length, with a girth of from 12½ to 14 inches, and a tip-to-tip interval ranging from 8¾ to 19 inches.

76. 2. 19. 1. Skin, mounted, and skull. Caucasus. *Purchased*, 1876.

79. 11. 15. 1. Skin, mounted, referable either to this or the next race. In their flattened and somewhat knotted front surface the horns are very similar to those

(No. 13. 2. 1. 1) entered as *C. c. caucasica*. Also skull of same (1690, *a*). *Purchased*, 1879.

7. 11. 10. 2. Skin, mounted. Eastern Caucasus. *Presented by Prince Paul Demidoff*, 1907.

7. 11. 10. 1. Head, female, mounted, and body-skin. Eastern Caucasus. *Same history.*

93. 11. 20. 1. Skull, with horns, and skin. Kasbek, Eastern Caucasus. *By exchange*, 1893.

93. 11. 20. 2. Skull, with horns, and skin, immature. The horns are distinctly ridged, as appears to be generally the case in immature animals. Kasbek. *Same history.*

12. 7. 14. 1–3. Three skulls, with horns. Eastern Caucasus. All are unusually fine specimens. *Presented by St. George Littledale, Esq.*, 1912.

B.—Capra caucasica caucasica.

Capra caucasica, *Güldenstädt, in Pallas, Acta Ac. Petrop.* vol. iii, pt. 2, p. 273, 1779; *Menzbier, Proc. Zool. Soc.* 1887, p. 618; *Satunin, Zool. Jahrb., Abt. f. Syst.* vol. ix, p. 311, 1896, *Privoda i ochota Moskva*, vol. xxxvii, pt. 8, 1909; *Dinnik, Zool. Beob.* vol. xlix, p. 338, fig. 2, 1908*; *Mat. faun. flor. Ross*, vol. ix, p. 1, 1909; *Camarano, Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, p. 284, 1906; *Trouessart, Faune Mamm. Europe*, p. 240, 1910.

Ægoceros ammon, *Pallas, Zoogr. Rosso.-Asiat.* vol. i, p. 221, 1811, *nec* Capra ammon, *Linn.*

Hybrid (?) C. cylindricornis and C. caucasica, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 251, 1898.

Typical locality the district of Malka and Baksan, eastward of Mount Elbruz, Central Caucasus, whence the range extends to Mount Dychtau.

Horns somewhat less bharal-like than those of *C. c. cylindricornis*, being frequently long and slender, subquadrangular in section, with the front surface flattened and devoid of knots, but in other cases shorter, stouter, and more nearly triangular in section, with incipient (or vanishing) knots; terminal curve including about one-third total length. According to Dinnik,† the horns are to a considerable extent intermediate between those of *C. c. cylindricornis* and those of *C. severtzowi*, but nearer the former than to the latter, the

* Name printed *caucasia*.

† *Op. cit.* p. 338.

resemblance being sometimes so close that it is difficult to say whether specimens should be referred to *cylindricornis* or to true *caucasica*. This, taken in conjunction with the form of the beard, seems to indicate that these two tur are local races of one and the same species.

According to Dinnik, the general colour in winter is darkish brown, but in summer reddish grey, with a dark dorsal streak, the head reddish brown, darker in front than on the sides. The front of the legs is dark, the inner surface of the thighs white. Tail shorter than in *cylindricornis*.

13. 2. 1. 1. Frontlet and horns (fig. 36) provisionally referred to this race. Caucasus. Length of horns on front curve $26\frac{3}{4}$ inches (68·5 cm.), girth $11\frac{3}{4}$ inches (30 cm.), tip-to-tip interval $21\frac{1}{2}$ inches (55 cm.). In a specimen described by Dinnik * the length is $29\frac{1}{2}$ inches (77 cm.), and the girth $12\frac{1}{4}$ inches (37 cm.). In other specimens, of a more slender type, the length may reach $33\frac{5}{8}$ inches (83 cm.), with a girth of only $10\frac{5}{8}$ inches (27 cm.).

Presented by R. Lydekker, Esq., 1913.

II. CAPRA SEVERTZOWI.

Capra severtzowi, *Menzbier*, *Proc. Zool. Soc.* 1887, p. 618.

Western Tur.

Synonymy under heading of subspecies.

Typical locality Western Caucasus.

Horns ibex-like, subtriangular in section, and curving backwards in one plane, with the tips directed downwards (as in fig. 37), and more or less distinct knots on front surface; beard, when fully developed, elongated in its middle portion and narrow and straight in summer.

Horns from the Rhætian Alps (fig. 37) present a close resemblance to those of the present species, although an approximation to the former is made of certain heads of *C. ibex* figured by Camerano.† The Rhætian horns are stated to have been found, with other skulls and skeletons, in a glacial moraine at Lauternabach, in the Roseg district, and

* *Op. cit.* p. 339.

† *Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, pl. 1, figs. 5, 10, 11, 1896.

are believed to be about three centuries old.* The length along front curve is 75 cm., and the tip-to-tip interval 74 cm.;

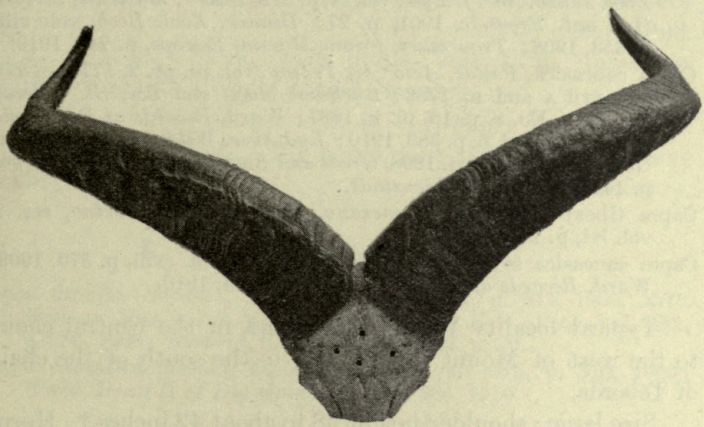

FIG. 36.—FRONTLET AND HORNS OF EAST CAUCASIAN TUR (*Capra caucasica*).

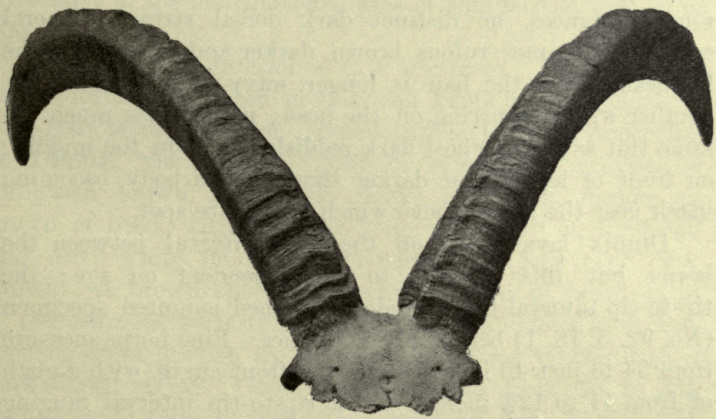

FIG. 37.—FRONTLET AND HORNS OF AN IBEX, OR TUR, from a glacial moraine in the Roseg district, Rhætian Alps.

From a photograph of Mr. A. Ghidini.

this equality in the two measurements being paralleled in a pair of horns of *C. severtzowi* mentioned by Dinnik, in which they are respective 80 and 85 cm.

* Ghidini, *Diana*, Geneva, May, 1909, p. 68.

A.—Capra severtzowi severtzowi.

Capra severtzowi, *Menzbier*, *Proc. Zool. Soc.* 1887, p. 618; *Satunin*, *Zool. Jahrb. Abt. f. Syst.* vol. ix, p. 312, 1896 *; *Matschie*, *Sitzber. Ges. nat. Freunde*, 1901, p. 27; *Dinnik*, *Zool. Beob.* vol. xlix, p. 353, 1908; *Trouessart*, *Faune Mamm. Europe*, p. 240, 1910.

Capra caucasica, *Pallas*, *Acta Ac. Petrop.* vol. iii, pt. 2, 1779, p. 273, pls. xvii A and B, 1783; *Büchner*, *Mém. Ac. Sci. St. Pétersb.* vol. xxxv, No. 8, p. 16, pl. ii, 1887; *Ward*, *Records of Big Game*, p. 227, 1896, ed. 6, p. 383, 1910; *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 246, pl. xxi, 1898, *Great and Small Game of Europe, etc.* p. 141, 1901, nec *Güldenstädt.*

Capra (Ibex) severtzowi, *Camerano*, *Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, p. 284, 1906.

Capra caucasica severtzowi, *Lydekker*, *Field*, vol. cxiii, p. 376, 1909; *Ward*, *Records of Big Game*, ed. 6, p. 383, 1910.

Typical locality Western Caucasus, in the central chain, to the west of Mount Elbruz, and to the south of the chain of Teberda.

Size large; shoulder-height 38 to about 42 inches.† Horns long, with relatively small knots on front surface; beard, when fully developed, of moderate length. General colour in summer tending more or less to rufous, with, at least in some, instances, no distinct dark dorsal stripe. General colour in summer rufous brown, darker and browner on the forehead, where the hair is longer, wavy, and forms whorls, another whorl occurring on the nose; under-parts much the same tint as back,‡ chest dark reddish brown in the middle; on front of legs colour darker than on the body, becoming black near the hoofs, above which is a white spot.

Dinnik lays stress on the wide interval between the horns, but this appears to be dependent on age; the tip-to-tip interval in the undermentioned mounted specimen (No. 92. 3. 16. 1) being only 16 inches. Fine horns measure from 34 to just 40 inches along the front curve, with a girth of from 11 to $12\frac{5}{8}$ inches, and a tip-to-tip interval ranging from $15\frac{1}{4}$ to $27\frac{5}{8}$ inches.

92. 3. 16. 1. Skin, in summer coat, mounted, and skeleton. Western Caucasus.

Presented by St. George Littledale, Esq., 1893.

* Name spelt *severzowi*.

† Forty-three inches = 109 cm., according to Dinnik.

‡ Dinnik gives the general colour as reddish grey, and that of flanks and under-parts dirty white.

92. 3. 16. 2. Skull, with horns, and skin. Western Caucasus. *Same history.*

2. 6. 15. 1. Skull, with horns, and skin. Western Caucasus. *Same donor*, 1902.

92. 1. 1. 2. Skull, with horns, and skin, immature. Sources of Malka River, Central Caucasus.

By exchange with St. Petersburg Museum, 1892.

92. 1. 1. 3. Skull, with horns, and skin, female. Same locality. *Same history.*

B.—Capra severtzowi dinniki.

Capra dinniki, *Satunin*, *Anat. Anz.* vol. xxix, p. 344, 1905, *Mitt. Kaukas. Mus.* vol. ii, p. 82, 1905; *Dinnik*, *Zool. Beob.* vol. xlix, p. 356, 1908; *Rasevig*, *Semja ochotn.* 1909, p. 39.

Capra caucasica dinniki, *Lydekker*, *Field*, vol. cxiii, p. 376, 1909; *Ward*, *Records of Big Game*, ed. 6, p. 384, 1910.

Typical locality the main chain of the North-western Caucasus; also occurring on the upper courses of the Belaya and Laba; Mount Shungus forming the north-western extremity of the distributional area of this race as well as of the species.

Height a little inferior to *C. s. severtzowi*. Horns shorter and thicker, with more pronounced knots on front surface, and thus more ibex-like. Beard rather longer. According to Dinnik, the general colour in summer is greyish or yellowish brown, lighter on flanks and back, darker on crown of head, with the hair long and wavy on forehead, and dirty white on the under-parts; the legs very dark brown. A brown spot on the chin in front of beard, as in *C. caucasica cylindricornis*. In winter the colour is darker, varying from greyish to yellowish or rufous brown with a dark dorsal stripe. Good horns measure from 30 to 34½ inches along front curve, with a girth of from 11½ to 12¼ inches, and a tip-to-tip interval of from 16¾ to 25¼ inches.

86. 9. 20. 1. Skin, in winter coat, mounted. Near Mount Elbruz; collected by P. A. Holst, Esq. *Purchased*, 1886.

86. 9. 20. 2. Skin, immature, in winter coat, mounted. Same locality and history. *Purchased*, 1886.

88. 5. 15. 1. Skull, with horns. North-west Caucasus. *Presented by St. George Littledale, Esq.*, 1888.

INCERTÆ SEDIS.

Capra raddei, *Matschie, Sitzber. Ges. nat. Freunde*, 1901, p. 32; *Satunin, Mitt. Kaukas. Mus.* vol. ii, p. 82, 1905; *Dinnik, Zool. Beob.* vol. xlix, p. 321, 1908.

Typical locality upper part of Ingur Valley, Caucasus.

Both Satunin and Dinnik are of opinion that this is not a distinct form.

III. CAPRA PYRENAICA.

Capra pyrenaica, *Schinz, N. Denkschr. schweiz. Ges.* vol. ii, p. 9, pls. ii, iii, 1838; *Blasius, Säugeth. Deutschl.* p. 480, 1857; *Busk, Trans. Zool. Soc.* vol. x, p. 118, 1877; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* p. 250, 1884; *Lydekker, Cat. Foss. Mamm. Brit. Mus.* pt. ii, p. 41, 1885, *Wild Oxen, Sheep, and Goats*, p. 253, pl. xxii, 1898, *Great and Small Game of Europe, etc.* p. 149, 1901; *Sclater, Proc. Zool. Soc.* 1886, p. 315; *Nathusius, Zool. Anzeig.* 1888, p. 333; *Chapman and Buck, Wild Spain*, p. 129, 1893; *Ward, Records of Big Game*, p. 228, 1896, ed. 6, p. 381, 1910; *Camerano, Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, p. 284, 1906; *Carruccio, Boll. Soc. Zool. ital.* ser. 2, vol. x, p. 184, 1909; *Trouessart, Faune Mamm. Europe*, p. 237, 1910; *Miller, Cat. Mamm. W. Europe Brit. Mus.* p. 989, 1912.

Ægoceros pyrenaica, *Gray, Cat. Ungulata Brit. Mus.* p. 147, 1852, *Cat. Ruminants Brit. Mus.* p. 52, 1872, *Hand-List Ruminants Brit. Mus.* p. 123, 1873; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 294, 1862.

Ibex pyrenaicus, *Gervais, Hist. Nat. Mamm.* vol. ii, p. 188, 1855; *Graells, Mem. Ac. Madrid*, vol. xvii, p. 353, 1897.

Ammotragus (?) pyrenaicus, *Nathusius, Zool. Anzeig.* 1888, p. 333.

PYRENEAN IBEX.

Typical locality Pyrenees.

Horns of the "perverted" homonymous type, without distinct knots, markedly compressed laterally, forming an open spiral with the tips bent backwards over the neck; their antero-external border raised into a rim, and their general direction upwards, outwards, and finally backwards, with the extreme tips upwards. Colour relatively light (paler than in *C. ibex*), with sharply defined dark areas. Beard, in winter, long. General colour pale brown, with outer sides of limbs black, a black band on lower part of flanks, and a short black mane, continued along the back as a narrow stripe; forehead and beard blackish or very dark brown, and under-parts and inner sides of limbs white. In winter a whitish under-fur. In summer ground-

colour browner, and black areas more definite. Females and young males lack a mane and black markings on head and body, showing a blackish tint only on front of limbs; in males the black areas appear in the second or third year, becoming larger and darker with age. Height at shoulder from about 27 to 32 inches.

The distributional area includes the mountains of Spain and Portugal; four local races being recognised.

A.—Capra pyrenaica pyrenaica.

Capra pyrenaica typica, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 257, 1898.

Capra pyrenaica pyrenaica, *Cabrera, Proc. Zool. Soc.* 1911, p. 966; *Miller, Cat. Mamm. W. Europe Brit. Mus.* p. 990, 1912.

Typical locality Spanish Pyrenees; the distributional area formerly including the Pyrenees and eastern part of the Cantabrian chain, but now restricted to region of Mt. Perdido, Huesca.

Dark markings attaining the maximum development; lateral stripe broad, black of withers extending downwards nearly or quite to that of upper part of legs; horns widely spreading, with rim on antero-internal border sharply defined. Good horns measure from 28 to 31 inches along outer curve, with a girth of from $8\frac{1}{4}$ to $10\frac{1}{2}$ inches, and a tip-to-tip interval ranging from 20 to $28\frac{3}{4}$ inches.

48. 2. 5. 4. Skin, mounted. Pyrenees. *Purchased*, 1848.

48. 2. 5. 5. Skull, female. Pyrenees. *Purchased*, 1848.

0. 10. 28. 1. Head, female, mounted. Spain.
Presented by Lieut.-Col. J. Marriott, 1900.

50. 9. 4. 1. Immature skin, mounted. Spain.
Presented by Sir R. Owen, K.C.B., 1850.

68. 9. 12. 12. Immature skin. Spain.
Presented by the Zoological Society, 1868.

B.—Capra pyrenaica lusitanica.

Capra lusitanica, *Franca, Bull. Soc. Port. Sci. Nat.* vol. ii, p. 144, 1909, based on the "Cabra-Montez da Serra do Gerez" of Bocage, *Mem. Ac. R. Sci. Lisboa*, ser. 2, vol. ii, pt. i, p. 1, pls. i, ii.

Capra pyrenaica lusitanica, *Miller, Cat. Mamm. W. Europe Brit. Mus.* p. 991, 1912.

Typical locality Serra do Gerez, Minho, Portugal; but distributional area formerly embracing the mountains of Galicia and northern Portugal.

Horns apparently less divergent than in other races.

No specimens of this race (which may be extinct) in collection.

C.—Capra pyrenaica victoriæ.

Capra pyrenaica victoriæ, *Cabrera*, *Proc. Zool. Soc.* 1911, p. 975; *Miller*, *Cat. Mamm. W. Europe Brit. Mus.* p. 991, 1912.

Typical locality Madrigal de la Vera, southern slope of Sierra de Gredos, Cáceres, Spain.

Intermediate in size and in extent of black markings, between *pyrenaica* and *hispanica;* rather browner than *hispanica* in summer, with horns similar in size to those of that race, but relatively broader and flatter.

No specimen in collection.

D.—Capra pyrenaica hispanica.

Capra hispanica, *Schimper*, *C. R. Ac. Sci. Paris*, vol. xxvi, p. 318, 1848; *Rosenhauer*, *Thiere Andalusiens*, p. 4, 1856; *Busk*, *Trans. Zool. Soc.* vol. x, p. 118, 1877; *Chapman and Buck*, *Wild Spain*, p. 129, 1893.

Ibex hispanicus, *Gervais*, *Hist. Nat. Mamm.* vol. ii, p. 189, 1855; *Graells*, *Mem. Ac. Madrid*, vol. xvii, p. 357, 1897.

Capra pyrenaica hispanica, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 258, 1898, *Great and Small Game of Europe, etc.* p. 151, 1901; *Ward*, *Records of Big Game*, ed. 6, p. 381, 1910; *Trouessart*, *Faune Mamm. Europe*, p. 237, 1910; *Miller*, *Cat. Mamm. W. Europe Brit. Mus.* p. 991, 1912.

Typical locality Sierra Nevada ("Picacho de Veleta et Mulahacen"), Spain. Distributional area includes mountains of southern and eastern Spain (Sierra de Ronda, Sierra Nevada, Sierra Morena, Sierra Martés, and Sierra de Cardó).

Dark markings less developed than in other races; dark lateral stripe narrow, and black of withers confined to median line; nasal bones more abruptly narrowed than in typical race; horns widely spreading, less compressed than in *victoriæ*, with antero-internal rim less defined than in typical *pyrenaica*.

55. 11. 26. 14. Skin, mounted. Southern Spain. *Purchased*, 1855.

777, *b*. Skull of preceding specimen. *Same history.*

IV. CAPRA IBEX.

Capra ibex, *Linn. Syst. Nat.* ed. 10, vol. i, p. 68, 1758, ed. 12, vol. i, p. 95, 1766; *Desmarest, Mammalogie*, vol. ii, p. 480, 1822; *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 300, vol. v, p. 357, 1827; *Gray, List Mamm. Brit. Mus.* p. 167, 1843, *Knowsley Menagerie*, p. 32, 1850, *Cat. Ungulata Brit. Mus.* p. 142, 1862, *Cat. Ruminants Brit. Mus.* p. 52, 1872, *Hand-List. Ruminants Brit. Mus.* p. 123, 1873; *Blasius, Säugeth. Deutschl.* p. 475, 1857; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 248, 1884; *Sclater, Proc. Zool. Soc.* 1886, p. 315; *Reichenau, N. Jahrb. Min.* 1896, vol. i, p. 221; *Ward, Records of Big Game*, p. 227, 1896, ed. 6, p. 372, 1910; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 273, 1898, *Great and Small Game of Europe, etc.* p. 162, 1901; *Trouessart, Faune Mamm. Europe*, p. 236, 1910; *Miller, Cat. Mamm. W. Europe Brit. Mus.* p. 989, 1912.

Capra alpina, *Girtanner, Journ. Physique*, vol. xxviii, p. 224, 1786.

Ægoceros ibex, *Pallas, Zoogr. Rosso-Asiat.* vol. i, p. 224, 1811, in part.

Ibex alpinus, *Gray, List Osteol. Brit. Mus.* p. 59, 1847; *Nehring, Tundren und Steppen*, p. 206, 1890.

Ibex europæa, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xvi, p. 700, 1847.

Capra (Ibex) ibex, *Camerano, Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, p. 284, 1906, lvii, p. 1907.

Capra ibex graicus, *Matschie, Deutsche Jäger-Zeitung*, vol. lix, p. 102, 1912—invalid, *teste Camerano, Bull. Mus. Zool. e. Anat. Torino*, vol. xxvii, No. 656, 1912.

Alpine Ibex.

Typical locality Swiss Alps; the distributional area formerly including the greater part of the Alps, but now restricted to a few localities in Piedmont, Italian Alps.

Height about 32 to 34 inches. Horns inclining backwards in a bold scimetar-like sweep, distinctly triangular in section, with the front surface broad, flattened, and carrying a number of bold transverse knots or knobs. Beard, which is confined to chin, moderate. General colour dusky grey, darker on chin, upper portion of throat and under-parts; blackish below and along anterior surface above, this dark area not noticeably contrasted or sharply defined; tail coloured like body at base, blackish at tip. Fine horns measure from 30 to 44⅝ inches along front curve, with a girth of from 9 to 10¼ inches, and a tip-to-tip interval ranging from 21 to 40 inches.

620, *b*. Skin, mounted. Alps.

Presented by Mrs. A. G. Campbell, before 1872.

650, *a*. Skin, mounted. Alps. *Purchased, before* 1872.

97. 12. 11. 1. Skin, mounted. Piedmont side of Monte Rosa. *Purchased,* 1897.

35. * * *. Skull, with horns. Alps. *Presented by Messrs. Murray and Brockedon,* 1835.

45. 12. 16. 1. Horns, Chamonix. *Purchased,* 1845.

650, *a'*, *b'*. Two pairs of horns. Alps. *Purchased.*

57. 3. 18. 2. Skull, female, with horns. *Purchased,* 1857.

57. 3. 18. 2. Skull, young. *Purchased,* 1857.

V. CAPRA SIBIRICA.

Capra alpium sibiricum, *Pallas, Spicil. Zool.* fasc. 11, p. 31, pl. iii, 1766.

Capra sibirica, *Meyer, Zool. Annal.* vol. i, p. 397, 1794; *Gray, List Mamm. Brit. Mus.* p. 52, 1843, *Cat. Ungulata, Brit. Mus.* p. 150, 1852, *Cat. Ruminants Brit. Mus.* p. 52, 1872, *Hand-List Ruminants Brit. Mus.* p. 194, 1873; *Blasius, Säugeth. Deutschl.* p. 481, 1851; *Radde, Reise Öst.-Siberien,* vol. i, p. 243, pl. x, 1862; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 248, 1862; *Jerdon, Mamm. India,* p. 292, 1867; *Kinloch, Large Game Shooting,* pt. i, p. 3, 1869; *Lydekker, Journ. Asiat. Soc. Bengal,* vol. xlvi, pt. 2, p. 286, 1877, *Wild Oxen, Sheep, and Goats,* p. 275, pl. xxiv, 1898, *Great and Small Game of Europe, etc.* p. 167, 1901, *Game Animals of India, etc.* p. 113, 1907, *Cat. Hume Bequest Brit. Mus.* p. 13, 1913; *Severtzow, Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 333, 1878; *Blanford, Scient. Results 2nd Yarkand Miss., Mamm.* p. 86, 1879, *Fauna Brit. India, Mamm.* p. 503, 1891; *Pousargues, Mém. Soc. Zool. France,* p. 162, 1898; *Sterndale, Mamm. India,* p. 444, 1884; *Sclater, Proc. Zool. Soc.* 1886, p. 316; *Przewalski, Cat. Zool. Collect.* p. 15, 1887; *Thomas, Trans. Linn. Soc.—Zool.* ser. 2, vol. v, p. 64, 1889; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 143, 1891; *True, Proc. U.S. Nat. Mus.* vol. xvii, p. 6, 1894; *Ward, Records of Big Game,* p. 224, 1896, ed. 6, p. 369, 1910; *Noack, Zool. Anz.* vol. xxvi, p. 390, 1903.

Ægoceros ibex, *Pallas, Zoogr. Rosso-Asiat.* vol. i, p. 224, 1811, in part.

Capra pallasi, *Schinz, N. Denks. schweiz. Ges.* vol. ii, p. 9, 1838, *nec* Ægoceros pallasi *Rouillier,* vide *Proc. Zool. Soc.* 1887, p. 553.

Capra ibex, *Hodgson, Journ. Asiat. Soc. Bengal,* vol. x, p. 913, 1841, vol. xi, p. 283, 1842, nec. *Linn.*

Capra ibex himalayanus, *Hodgson, Calcutta Journ. Nat. Hist.* vol. ii, p. 414, 1842.

Capra himalayana, *Schinz, Synop. Mamm.* vol. ii, p. 463, 1845; *Gray, Cat. Ungulata Brit. Mus.* p. 150, 1852; *Adams, Proc. Zool. Soc.* 1858, p. 523.

Ibex sibirica, *Hodgson, Journ. Asiat. Soc. Bengal,* vol. xvi. p. 700, 1847.

Ibex sibiricus, *Nehring, Tundren und Steppen*, p. 111, 1890.
Capra (Ibex) sibirica, *Camerano, Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, p. 284, 1906.

Asiatic Ibex.

Typical locality northern slope of Sayansk Mountains, in the neighbourhood of Munku Sardyx, west of Lake Baikal.

Nearly related to *C. ibex*, but the size considerably larger (the height at the shoulder sometimes reaching as much as about 42 inches), the horns often larger, and the beard longer and more profuse. Horns very massive, with the front surface very wide, without any bevelling of the outer edge, and the outer side of the bold transverse knots almost as much developed as the inner; the section being completely triangular, with the hind angle compressed. Hair, in winter, long, coarse, and brittle, developed into a dorsal crest, and with a thick layer of under-fur; in summer short. Usually a more or less defined light saddle-patch, which may extend over much of back and sides. General colour variable, but usually some shade of brown in summer, and lighter (frequently yellowish white) in winter. Dorsal stripe, tail, and frequently beard blackish brown; under-parts and most or whole of limbs dark. Maximum horn-length (in Tian Shan race) 58 inches along front curve, with a girth of $11\frac{1}{4}$ inches.

The distributional area includes the high mountains of Central Asia, from the neighbourhood of Lhasa and Lake Baikal, the Tian Shan, and the Altai to the Himalaya (exclusive of the Pir Panjal), and from the Herat district to Kumaon and adjacent provinces as far east as the source of the Ganges.

The species has been divided into a large number of local races, but as many of these are known merely by their horns, it is practically impossible to draw up a "key."

A.—Capra sibirica sibirica.

Capra sibirica typica, *Lorenz, Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 95, pl. i, 1906; *Lydekker, Game Animals of India, etc.* p. 116, 1907 (nec *Wild Oxen, Sheep, and Goats*, p. 281, 1898); *Ward, Records of Big Game*, ed. 6, p. 369, 1910.

Typical locality Sayansk Mountains, west of Lake Baikal. General colour in winter dirty yellowish white, tending

to purer white on middle of back; under-parts browner, owing to dark hair-tips; forehead, ring round eye, occiput, ears, and sides of neck darker. A thin white line on upper lip and a broader one on lower lip; a narrow dark dorsal stripe and faint shoulder-stripe. Hind-legs brown in front and whitish on outer side inferiorly, and some white on hind surface of fore-legs near lateral hoofs. In old bucks, which may become nearly white, the colour pattern recalls that of *C. hircus ægagrus*.

No specimen in collection.

B.—Capra sibirica fasciata.

Capra fasciata, *Noack*, *Zool. Anz.* vol. xxv, p. 623, 1902, vol. xxvi, p. 390, 1903.

Capra sibirica fasciata, *Lorenz*, *Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 87, 1906; *Lydekker*, *Game Animals of India, etc.* p. 116, 1907.

Typical locality North-east Altai, or Bia Altai, in the neighbourhood of Lake Telezko.

General colour (season not stated) yellowish brown above, with a dark spot on lower lip at angle of mouth; a broad horizontal black band on lower part of fore-legs; a light patch on posterior surface of lower part of hind-legs, and a hair-whorl on outer side of same; ears large and rounded, lighter internally; iris brownish red.

No specimen in collection.

C.—Capra sibirica altaica.

Capra altaica, *Noack* (ex *Schinz*, 1845), *Zool. Anz.* vol. xxv, p. 623, 1902.

Capra sibirica altaica, *Lorenz*, *Denks. K. Ak. Wiss. Wien*, vol. lxxx, pp. 87, 96, pl. ii, 1906; *Lydekker*, *Game Animals of India, etc.* p. 116, 1907.

Typical locality Irtish Altai.

Very similar in winter coat to typical *sibirica*, being light dirty white, but with a rufous tinge, and a dark flank-band. Face, fore part of neck, and shoulder less dark than in typical race, and their colour merging gradually into that of body. In summer general colour greyish brown, without a light saddle-patch; the tint being described as *café-au-lait*

with a dark dorsal stripe. Horns light-coloured, and strongly curved at tips; iris yellowish grey.

78. 12. 21. 31. Skull, with horns. Tarbagatai, Altai; collected by Dr. O. Finsch. Noticed by Lorenz, *op. cit.*

By exchange with Geographical Society of Bremen, 1878.

90. 4. 20. 8. Skeleton, with horns. Saiar Mountains, Altai. Referred to this race by Lorenz.

Presented by St. George Littledale, Esq., 1890.

D.—Capra sibirica lydekkeri.

Capra sibirica lydekkeri, *Rothschild, Novit. Zool.* vol. vii, p. 277, pl. ii, 1900; *Noack, Zool. Anz.* vol. xxvi, p. 650, 1903; *Lorenz, Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 87, 1906; *Lydekker, Game Animals of India, etc.* p. 116, 1907.

Capra sibirica dauvergnei (?), *Lydekker, Proc. Zool. Soc.* 1900, p. 114.

Typical locality Katutay district of Irtish Altai. Type in Tring Museum.

Size very large and horns unusually massive. General colour in winter umber-brown, rather lighter than that of *almasyi* at same season, with the face,* forehead, neck-patch, a dorsal saddle, hind-quarters and posterior aspect of hind-legs above hocks dirty or creamy white. The light saddle is intermediate in size between that of *wardi* and that of *almasyi*. In the type the horns measure 46½ inches along curve and 12 in girth.

0. 3. 26. 1. Skull, with horns, seven years old. Katutay, Irtish Altai. *Presented by the Hon. Walter Rothschild*, 1900.

E.—Capra sibirica hagenbecki.

Capra sibirica hagenbecki, *Noack, Zool. Anz.* vol. xxvi, p. 384, 1903; *Lorenz, Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 89, 1896; *Lydekker, Game Animals of India, etc.* p. 118, 1907.

Typical locality Kobdo, Gobi. The race appears to have a wide range in Mongolia.

General colour pale breadcrust-brown, without light

* *Teste* Lorenz, *op. cit.* p. 87; in the plate in *Novitates* the whole face is represented as brown; in that plate the brown is too yellow and too light.

saddle; a callosity on knee; horns approximating to those of typical race, but knots in middle portion larger and more approximated.

No specimen in collection.

F.—Capra sibirica almasyi.

Capra sibirica almasyi, *Lorenz*, *Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 89, 1906; *Lydekker*, *Game Animals of India*, *etc.* p. 118, 1907.

Capra sibirica typica, *Lydekker*, *Wild Oxen*, *Sheep*, *and Goats*, p. 281, 1898, nec *Mayer*.

Capra sibirica sibirica, *Rothschild*, *Novit. Zool.* vol. vii, p. 277, 1900, nec *Meyer*.

Typical locality Tian Shan, including Kulja district.*

General colour in winter some shade of greyish brown,† usually darker than is *lydekkeri;* head still darker, but paler

Fig. 38.—Head of Tian Shan Ibex (*Capra sibirica almasyi*).

on forehead and between ear and eye; narrow white margins to lips; beard, which is long, greyish brown; a broad dark dorsal stripe. A small light neck-patch and saddle frequently present, which may, however, be obscured by the brown tips

* *Capra "sibiricæ affinis,"* Noack, *Zool. Anz.* vol. xxvi, p. 650, 1903, is, as mentioned by Lorenz, *op. cit.*, invalid.

† This is the description given by Lorenz; the present writer has described the colour as yellowish white, more or less tinged with grey or brown.

of the hairs; back of legs light-coloured, in some specimens nearly white. In summer the general colour reddish brown fawn, tending to grey on head, a distinct light neck-patch and saddle, which may be nearly white, and hind surface of limbs whitish. Horns very long and relatively slender, with comparatively small knots, and the tip-to-tip interval generally small (not so in the head here figured) Fine horns measure from 54 to 58 inches along front curve, with a girth of from $10\frac{1}{4}$ to $11\frac{3}{4}$ inches, and a tip-to-tip interval ranging from 24 to $44\frac{1}{2}$ inches. In one specimen of 58 inches the tip-to-tip interval is $44\frac{1}{2}$, while in another of $57\frac{1}{2}$ it is only 24 inches.

2. 1. 12. 1. Skin, in summer coat, mounted, of a ten-year old buck. Near Kulja.

Presented by P. V. Van der Byl, Esq., 1902.

2. 3. 9. 4. Head, mounted, of a twelve-year old buck (fig. 38). Length of horns $50\frac{5}{8}$, girth $11\frac{1}{4}$, tip-to-tip interval $35\frac{1}{2}$ inches. Near Kulja.

Presented by St. George Littledale, Esq., 1902.

2. 3. 9. 3. Skin, in summer coat. Lower Kok-su, Tian Shan. There is a distinct dorsal stripe, and a moderate sized whitish saddle patch.

Presented by St. George Littledale, Esq., 1902.

2. 3. 9. 5. Skull, with horns. Near Kulja. *Same history.*

13. 2. 6. 2. Body-skin, summer coat. Near Kulja

Presented by Col. J. H. Abbot Anderson, 1913.

G.—Capra sibirica merzbacheri.

Capra sibirica merzbacheri, *Leisewitz, Zool. Anz.* vol. xxix, p. 654, 1906; *Lorenz, Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 89, 1906; *Lydekker, Game Animals of India, etc.* p. 118, 1907.

Typical locality central Tian Shan, inclusive of the Naryn district.

Stated to differ from *almasyi* by the lighter tone of the dark areas, the more distinctly defined dorsal saddle, and the much shorter, more divergent, and more heavily knotted horns.

No specimen in collection.

H.—Capra sibirica alaiana.

Capra alaiana, *Noack, Zool. Anz.* vol. xxv, p. 629, 1902, vol. xxvi, p. 390, 1903.

Capra sibirica alaiana, *Lorenz, Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 89, 1906; *Lydekker, Game Animals of India, etc.* p. 118, 1907.

(?) Capra sibirica transalaiana, *Lorenz, op. cit.* p. 90; *Lydekker, loc. cit.*

Typical locality uncertain, the race being founded on a skin purchased in Tashkent; if *transalaiana* be the same, the locality will be in the neighbourhood of the Transalai.

General colour described as bright foxy red in winter, with a distinct light saddle, and in summer light greyish brown, with a dark dorsal stripe, but no light saddle. After remarking that such a seasonal colouring is the reverse of what normally occurs in this group of ibex, and suggesting that the absence of a light saddle in summer may be due to its obscuration by the presence of brown tips to the hairs, Lorenz proceeds to describe precisely similar features in his *transalaiana*, which is admitted to be probably inseparable from *alaiana*.

42. 4. 29. 73. Skin, mounted, provisionally referred to the present race. Siberia (?Altai).

By exchange with St. Petersburg Museum, 1842.

42. 4. 29. 73. Skin, mounted, female. Probably from same locality as preceding. *Same history.*

95. 12. 13. 2. Horns, and body-skin in summer coat. The skin shows a narrow and faint dorsal stripe, but no saddle-patch. North-west Altai, Chuja Steppe.

Presented by Major C. S. Cumberland, 1895.

52. 12. 9. 5. Skull, with horns, provisionally referred to this race. Altai; collected by Dr. Brandt. *Purchased*, 1852.

I.—Capra sibirica wardi.

Capra sibirica wardi, *Lydekker, Great and Small Game of India, etc.* p. 101, 1900, *Great and Small Game of Europe, etc.* p. 172, 1901, *Game Animals of India, etc.* pp. 115, 118, 1907; *Lorenz, Denks. K. Ak. Wiss. Wien*, vol. lxxx. p. 90, 1906; *Ward, Records of Big Game*, ed. 6, p. 369, 1910; *Camerano, Atti Ac. Sci. Torino*, vol. xlvi, 205, 1911.

Typical locality Braldu, Baltistan, in the neighbourhood of the Baltoro Glacier.

General colour in winter dark chocolate-brown, and a large buffish saddle, separated only by a narrow chocolate band from the whitish neck-patch. In size the saddle is intermediate between that of *lydekkeri* and the large one of *sakeen*. The horns approximate to those of *almasyi*, but are stouter, shorter, and narrower in transverse section.

0. 6. 25. 1. Skin, mounted. Braldu, Baltistan. Type. *Presented by J. Rowland Ward, Esq.*, 1900.

92. 7. 29. 1. Body-skin. Flanks of Nunga Parbat, Baltistan. Shows the larger white dorsal area. *Presented by H. Littledale, Esq.*, 1892.

75. 10. 9. 2. Skin, mounted, and skull, referred by Lorenz to this or a closely allied race. Tian Shan, north-west of Kashgar. *Presented by Gen. Sir T. E. Gordon, K.C.B.*, 1875.

79. 11. 21. 250. Skin, mounted, probably referable to same race as preceding. Near Yarkand; collected by Dr. Bellew. *Transferred from India Museum*, 1879.

91. 8. 7. 141. Skull, with horns. Flanks of Haramosh, between Gilgit and Baltistan. *Presented by A. O. Hume, Esq., C.B.*, 1891.

J.—Capra sibirica sakeen.

Capra sakeen, *Blyth, Journ. Asiat. Soc. Bengal*, vol. xi, p. 283, 1842.

Ægoceros skyn, *Wagner, Schreber's Säugthiere, Suppl.* vol. iv, p. 491, 1844.

Ibex sakin, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xvi, p. 700, 1847.

Capra skyn, *Severtzow, Ann. Mag. Nat. Hist.* ser. 4, vol. xviii, p. 334, 1878; *Przewalski, Peters' Mitth. Erzb.* vol. xii, p. 5, 1878.

Capra sakin, *Blanford, Fauna Brit. India, Mamm.* p. 504, 1891.

Capra sibirica sacin, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 284, 1898, *Proc. Zool. Soc.* 1901, vol. i, p. 91, pl. x, *Game Animals of India, etc.* p. 119, 1907; *Lorenz, Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 91, 1906; *Ward, Records of Big Game*, ed. 6, p. 369, 1910; *Camerano, Atti Ac. Sci. Torino*, vol. xlvi, p. 201, 1911.

Capra sibirica sakeen, *Rothschild, Novit. Zool.* vol. vii, p. 277, 1900; *Lorenz, op. cit.* p. 91, 1906; *Lydekker, Cat. Hume Bequest Brit. Mus.* p. 13, 1913.

Typical locality Kashmir, where this ibex inhabits the mountains on the northern and eastern sides of the valley, from which it may extend eastwards and northwards.

Greater portion of back (exclusive of a pale brown dorsal

stripe) and lower part of back of neck, as well as sides, pale brownish or creamy white ; general colour elsewhere, including limbs, light yellowish brown ; beard and tail blackish brown.

87. 6. 9. 1. Head, mounted. Jay Nai Nalla, Maru-Wardwan, Kashmir.

Presented by M. B. Stapylton, Esq., 1887.

88. 3. 20. 7. Skull, with horns. Kashmir.

Presented by R. Lydekker, Esq., 1888.

88. 3. 20. 8–9. Two skulls, with horns. Tilel Valley, Kashmir. *Same history.*

88. 3. 20. 10. Skull, with horns, female. Wardwan.

Same history.

92. 7. 29. 2. Body-skin. North of Gurais, Tilel. The whole coat is woolly, pale fawn-coloured above, and white on the under-parts, where hair is present.

Presented by H. Littledale, Esq., 1892.

76. 6. 21. 6. Skin, mounted, provisionally referred to this race. Himalaya ; collected by Capt. Barton.

Purchased, 1876.

91. 8. 7. 148. Skull, with horns. Sind Valley, Kashmir.

Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 152. Skull, with horns. Above Balusala, Kashmir. *Same history.*

12. 10. 31. 60. Skull, with horns. Kashmir.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 59. Skull, with horns, belonging to this or an allied race. Mushnai, Khagan, between Kashmir and Afghanistan. *Same history.*

K.—Capra sibirica dauvergnei.

Capra dauvergnei, *Sterndale, Journ. Bombay Nat. Hist. Soc.* vol. i, p. 24, 1886; *Blanford, Fauna Brit. India, Mamm.* p. 504, 1891.

Capra sibirica dauvergnei, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 285, 1898, *Great and Small Game of India, etc.* p. 107, 1901, *Game Animals of India, etc.* p. 119, 1907 ; *Rothschild, Novit. Zool.* vol. vii, p. 277, 1900 ; *Lorenz, Denks. K. Ak. Wiss. Wien*, p. 91. 1906.

Typical locality not definitely known, but, it is suggested, probably somewhere to the west of Kashmir.

Known solely by horns, which are characterised by their

dark colour and the slight development of the outer portion of the knobs, especially in the terminal third.

No specimen in collection.

L.—Capra sibirica pedri.

Capra sibirica pedri, *Lorenz, Denks. K. Ak. Wiss. Wien*, vol. lxxx, p. 104, 1906; *Lydekker, Game Animals of India, etc.* p. 119, 1907; *Camerano, Atti Ac. Sci. Torino*, vol. xlvi, p. 201, 1911.

Typical locality Gilgit.

A race with relatively slender horns, which are stated to approximate in general characters to those of *s. sibirica*. In a mounted head with part of the summer and part of the winter coat, the former is yellowish fawn, and the latter dark greyish brown.

With this race Lorenz provisionally associates a Ladak skull in the Museum, with horns stated to approximate to those of *s. sibirica;* but, on distributional grounds, it seems more probable that the Ladak ibex should be *filippii*, if this be a distinct form.

The Afghan and Chitral ibex (the latter of which has pale-coloured horns and no light saddle in the summer coat) are considered by Lorenz to represent probably a distinct race; but, on distributional grounds, it is likely that at least the Chitral ibex is inseparable from the present race.

3. 1. 15. 1. Mounted skin, provisionally referred to this race, in winter coat, Chitral. There is a broad dark dorsal stripe, but no sign of a light saddle-patch on the pale-coloured coat. *Presented by Capt. B. E. M. Gordon*, 1902.

The following specimens represent the Afghan ibex, of which the systematic position is still uncertain:—

86. 10. 15. 29–30. Two heads, mounted. Bala Murghab; collected by Dr. J. E. T. Aitchison, during Afghan Boundary Delimitation Commission.

Presented by the Government of India, 1886.

86. 10. 15. 28. Skull, with horns. Same locality and collector. *Same history.*

M.—Capra sibirica filippii.

Capra sibirica *subsp.* filippii, *Camerano, Atti Ac. Sci. Torino*, vol. xlvi, p. 209, 1911.

Capra sibirica filippii, *Lydekker, Cat. Hume Bequest Brit. Mus.* p. 14, 1913.

Typical locality Lahul.

A provisional race characterised by the slighter development of the knots of the horns, as compared with those of *wardi*, and more especially by the conformation of the lines of annual growth, which are stated to resemble those of *C. ibex;* the lateral surfaces of the horns are also stated to be more convex than in other races of the present species.

91. 8. 7. 150. Skull, with horns. Hills between Spiti and Kumaon. *Presented by A. O. Hume, Esq., C.B.*, 1891.

12. 10. 31. 61. Skull, with horns. Sutlej Valley above Rampur. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

The following specimens may belong to this race:—

12. 10. 31. 58. Skull, with horns. Upper Shyok Valley, Nubra, north of Leh; collected by Ney Elias, Esq. This specimen stands No. 39 in Ward's list. The horns measure 48½ inches in length and 9⅝ in girth, with a tip-to-tip interval of 30½ inches. *Same history.*

12. 10. 31. 57. Skull, with horns. Near Leh; collected by Mr. Elias. *Same history.*

79. 11. 21. 257. Skin and skull, with horns. Ladak; collected by Gen. Strachey. Shows a faint dorsal line, and a large white saddle-patch. *Transferred from India Museum*, 1879.

79. 11. 21. 490–491. Two skulls, with horns. Ladak; same collector. *Same history.*

79. 11. 21. 490, *a*. Skull, with horns (1359 *i*, Old Cat.). Ladak; same collector. *Same history.*

91. 8. 7. 153, 155–158. Five skulls, with horns. Near Leh; collected by A. Dalgleish, Esq. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 154. Skull, with horns. Mountains above Kalsi, Indus Valley below Leh. *Same history.*

It has not been found possible to determine, even provisionally, the respective races of the following specimens:—

87. 2. 9. 3. Head, young, mounted. Locality unknown; collected by A. Grote, Esq. *Presented by Mrs. Stirling*, 1887.

1359, *h*. Skull, with horns. Locality unknown; collected by Gen. Abbott. *Purchased*, 1856.

56. 9. 22. 7–8. Two skulls, with horns, and in one case (7) scalp. Locality unknown; same collector. *Same history.*

VI. CAPRA NUBIANA.

Capra nubiana, *F. Cuvier*, *Hist. Nat. Mamm.* fasc. vii, pl. 397, 1825; *Gray*, *Cat. Ungulata Brit. Mus.* p. 151, 1852, *Cat. Ruminants Brit. Mus.* p. 53, 1872, *Hand-List Ruminants Brit. Mus.* p. 124, 1873; *Gerrard*, *Cat. Bones Mamm. Brit. Mus.* p. 248, 1862; *Ward*, *Records of Big Game*, p. 230, 1896, ed. 6, p. 376, 1910; *Pousargues*, *Ann. Sci. Nat. Zool.* vol. iv, p. 85, 1897; *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 266, 1898, *Game Animals of Africa*, p. 89, 1908; *Anderson and de Winton*, *Zool. Egypt*, *Mamm.* p. 332, pl. lviii, 1902.

Capra (Ibex) nubiana, *Camerano*, *Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, p. 284, 1906.

Ibex nubiana, *Gaillard*, *Rev. Ethnogr. et Sociol.* 1912, reprint, p. 10.

Nubian Ibex: Bedin.

Typical locality Nubia.

Shoulder-height about 33 inches. Horns very long, slender, and much curved, with outer front angle bevelled off and front surface relatively narrow; the knots numerous, closely approximated, and relatively large. Ears relatively long, with white margins; beard long, pointed, and occupying full width of chin; some long hair below middle of nape of neck and a dorsal crest; coat elsewhere short. General colour brownish or yellowish fawn; muzzle, chin, beard, flanks, chest, nape-tuft, dorsal stripe, sides of tail, outer sides and front of legs blackish brown; inner sides of thighs and buttocks, a streak on abdomen, inner sides and back of lower part of limbs more or less white, and a white band above hoofs. The range includes Nubia, the Sinaitic Peninsula, and southern Arabia, each of these localities having a special race.

A.—Capra nubiana nubiana.

Capra nubiana typica, *Lydekker*, *Game Animals of Africa*, p. 89, 1908; *Ward*, *Records of Big Game*, ed. 6, p. 376, 1910.

Typical locality Nubia.

Range including Upper Egypt and mountains of Red Sea Littoral. General characters those given above. Good horns measure from 42 to 51 inches along front curve, with a girth of from 7½ to 8½, and a tip-to-tip interval of from 6¾ to 39½ inches.

* * * *. Skin, mounted. North Africa. *No history.*

† † † †. Skin, young, mounted. North Africa. *No history.*

55. 2. 19. 5. Skull, with horns. North Africa. *Purchased* (*Stevens*), 1855.

49. 10. 2. 1. Immature skull. North Africa. *Presented by Major Macdonald*, 1849.

651, *a–e*. Five pairs of horns. Egypt. In *a* the horns measure 46⅛ inches in length by 8 in girth. *Presented by J. Burton, Esq.*

3. 3. 13. 2. Skin, new-born fawn. Egypt. *Presented by Capt. S. S. Flower*, 1903.

B.—Capra nubiana sinaitica.

Capra sinaitica, *Hemprich and Ehrenberg*, *Symb. Phys. Zool.* vol. i, pl. xviii, 1828; *Sclater*, *Proc. Zool. Soc.* 1886, p. 316, pl. xxxii; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 144, 1891; *Ward*, *Records of Big Game*, p. 229, 1896.

Capra arabica, *Rüppell*, *Neue Wirbelth. Abyssin.*, *Säugeth.* vol. i, p. 17, 1835; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 249, 1884.

Ægoceros beden, *Wagner*, *Schreber's Säugthiere*, *Suppl.* vol. v, p. 1303, 1836.

Capra beden, *Blasius*, *Säugeth. Deutschl.* p. 482, 1857; *Tristram*, *Proc. Zool. Soc.* 1866, p. 85, *Fauna Palestine*, p. 6, pl. ii, 1884.

Capra nubiana sinaitica, *Lydekker*, *Great and Small Game of Europe*, *etc.* p. 173, 1901, *Game Animals of Africa*, p. 90, 1908; *Ward*, *Records of Big Game*, ed. 6, p. 376, 1910.

Typical locality Sinaitic Peninsula, Arabia.

Knots on horns narrower, taller, and more irregularly disposed than in typical race, and thereby approximating to those of *C. hircus ægagrus*. Good horns measure from 30 to

38½ inches along front curve, with a girth of from 6½ to 7½, and a tip-to-tip interval of from 12 to 15½ inches.

99. 2. 12. 1. Skin, immature, mounted. Sinaitic Peninsula. *Presented by Lieut.-Col. J. Marriott*, 1899.

5. 12. 12. 5. Skull, with horns. Hills east of Ain Musa, Giebel el Skata. *Presented by Mrs. Anderson*, 1905.

64. 8. 17. 14. Skin and skull, with horns. Engedi, near the Dead Sea. *Presented by Canon Tristram*, 1864.

64. 8. 17. 15. Immature skin, skull, and horns. Same locality. *Same donor.*

99. 11. 6. 87. Skull, with horns. Abian Mountains, east of Aden; collected by Messrs. Percival and Dodson. *Purchased*, 1899.

5. 7. 2. 20. Skin, female, bad condition. Mountains east of Karyatein, Syria; collected by D. Carruthers, Esq. *Purchased*, 1905.

C.—Capra nubiana mengesi.

Capra mengesi, *Noack, Zool. Anz.* vol. xxi, p. 353, 1896, vol. xxii, p. 13, 1897; see also *Sclater, Proc. Zool. Soc.* 1897, p. 900.

Capra sinaitica mengesi, *Lydekker, Great and Small Game of Europe, etc.* p. 173, 1901, *Game Animals of Africa*, p. 90, 1908; *Ward, Records of Big Game*, ed. 6, p. 376, 1910.

Typical locality Hadramaut, south-east Arabia.

Said to differ from *sinaitica* by the convexity of the inner surface of the horns. Good horns measure from 39½ to 50 inches along curve, with a girth of from 7¼ to 8⅞, and a tip-to-tip interval ranging from 12 to 19½ inches.

No specimen in collection.

VII. CAPRA WALIE.

Capra walie, *Rüppell, Neue Wirbelthiere Abyssin., Säugeth.* vol. i, p. 16, pl. vi, 1835; *Sclater, Proc. Zool. Soc.* 1886, p. 316; *Rothschild, ibid.* 1901, vol. ii, p. 281, *Appendix to Powell-Cotton's Sporting Trip through Abyssinia*, p. 478, 1902.

Capra valie, *Sundevall, K. Svenska Vet.-Ak. Handl.* 1844, p. 95, 1846; *Gray, Cat. Ungulata Brit. Mus.* p. 152, 1852.

Capra wali, *Richters, Big Game Shooting* (*Badminton Library*), vol. ii, p. 325, 1894.

Capra vali, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 270, 1898, *Game Animals of Africa*, p. 91, 1908; *Ward, Records of Big Game*, ed. 6, p. 374, 1910.

Capra (Ibex) vali, *Camerano, Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, p. 284, 1906.
Ibex wali, *Gaillard, Rev. Ethnogr. et Sociol.* 1912, reprint, p. 18.

Abyssinian Ibex: Wali.

Typical locality mountains of Simien, Abyssinia.

The original description is as follows:—"Front and upper side of head, neck, and back beautiful chestnut-brown; muzzle, a curved streak between eye and ear, sides of neck, body, and rump reddish umber-brown. Region under the eye and ear, the chin, throat, chest, and inner surface of the thighs and belly dirty white. Outer side of thighs and legs and sides of belly dirty grey. Feet whitish, with a large spot at the fetlock and a stripe down the legs black. Root of tail chestnut-brown, tip black. Inner side of ears white, with a reddish border, outer service red-brown. Iris of eye pale brown, pupil dark blue."

The principal points distinguishing this ibex from *C. nubiana* are the shorter beard and the thicker and stouter horns, which are more like those of *C. sibirica*. It differs from all other ibex in the bony protuberance on the forehead.

In Rüppell's type the horns were only 25 inches long, measured along the curve, but horns ranging $40\frac{5}{8}$ to $43\frac{7}{8}$ along the curve, with a girth of from $10\frac{1}{4}$ to $11\frac{1}{8}$, and a tip-to-tip interval of from $16\frac{3}{4}$ to 23 inches are known.

1. 6. 18. 1. Skin, mounted, and skull. Buahit Mountains, Simien, Abyssinia. Length of horns $43\frac{1}{2}$, girth $11\frac{1}{4}$, tip-to-tip interval 27 inches.

Presented by Major P. H. G. Powell-Cotton, 1900.

VIII. CAPRA HIRCUS.

Capra hircus, *Linn. Syst. Nat.* ed. 10, vol. i, p. 68, 1758, ed. 12, vol. i, p. 94, 1766.

The typical species, as represented by the domesticated goat of Sweden (*C. hircus hircus*). Characters generally those of the wild races, as given below, the beard being restricted to the chin, and the dark olive-brown or blackish horns sweeping backwards in a bold scimetar-like curve, with a sharp front edge, quite unlike the broad and knotted front surface of those of the more typical ibex.

A.—Capra hircus ægagrus.

Capra ægagrus, *Erxleben, Syst. Regn. Anim.* vol. i, p. 260, 1777; *Gmelin, Syst. Nat.* vol. i, p. 193, 1788; *Desmarest, Mammalogie*, vol. ii, p. 483, 1822; *Hutton, Calcutta Journ. Nat. Hist.* vol. ii, p. 521, pl. xix, 1142, *Journ. Asiat. Soc. Bengal*, vol. xv, p. 161, 1846; *Blasius, Säugeth. Deutschl.* p. 485, 1857; *Sclater, Proc. Zool. Soc.* 1874, p. 89, 1886, p. 315, pl. xxi, 1902, vol. ii, p. 226; *Blanford, Proc. Zool. Soc.* 1874, p. 248, *Journ. Asiat. Soc. Bengal*, vol. xliv, p. 15, 1875, *Eastern Persia*, vol. ii, p. 89, 1876, *Fauna Brit. India, Mamm.* p. 502, 1891; *Danford, Proc. Zool. Soc.* 1875, p. 458; *Danford and Alston, Proc. Zool. Soc.* 1877, p. 276; *Sterndale, Mamm. India*, p. 446, 1884; *Radde, Proc. Zool. Soc.* 1887, p. 552; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 142, 1891; *Satunin, Zool. Jahrb.* vol. ix, p. 311, 1896, *Jestestv. i georg.* vol. xliv, pt. 7, p. 13, 1909; *Ward, Records of Big Game*, p. 229, 1896; *Camerano, Mem. Ac. Sci. Torino*, ser. 2, vol. lvi, p. 284, 1906; *Miller, Cat. Mamm. W. Europe Brit. Mus.* p. 992, 1912.

Antilope gazella, *Gmelin, Syst. Nat.* vol. i, p. 190, 1788, *nec* Capra gazella, *Linn.*

Ægoceros ægagrus, *Pallas, Zool. Rosso-Asiat.* vol. i, p. 266, 1811; *Kotschy, Verh. Ver. Wien*, vol. iv, p. 201, 1854.

Capra caucasica, *Gray, List Mamm. Brit. Mus.* p. 167, 1843; *Adams, Proc. Zool. Soc.* 1858, p. 525, nec *Güldenstädt.*

Hircus gazella, *Gray, Cat. Ruminants Brit. Mus.* p. 53, 1872.

Capra hircus *var.* ægagrus, *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 251, 1884.

Capra hircus ægagrus, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 260, 1888, *Great and Small Game of Europe, etc.* p. 151, 1901; *Ward, Records of Big Game*, ed. 6, p. 378, 1910.

Wild Goat: Pasang.

Typical locality Daghestan district of the Caucasus.

Build relatively slender, with a shoulder-height reaching 37 inches. Horns triangular, much compressed, with inner front edge (the only one developed) sharp, keeled for some distance above base, and in terminal three-fourths carrying several widely sundered knobs; inner surface nearly flat, outer convex, rounded behind; tips generally convergent; faintly striated transversely throughout. Beard very long, and in old animals as wide as chin; hair on neck and shoulders elongated, especially in winter, when under-fur is developed. General colour in winter brownish grey, in summer reddish brown, paler in old males; under-parts and inner sides of buttocks and thighs white or whitish; face, a nucho-dorsal stripe, tail, a collar on neck, expanding into a breast-plate, throat, chin, beard, front of limbs (except knees), and a flank-stripe blackish brown, becoming black in places; knees, hind

and inner side of fore-legs and corresponding portions of hind-legs, including hocks, white or whitish. Females and young males lack most of the dark markings. Fine horns measure from 48 to 55 inches along curve, with a girth of from 8 to 10, and a tip-to-tip interval of from 7 to 24 inches. The distributional area extends from the Daghestan district of the Caucasus through the mountains of Asia Minor and Persia, including the Kopet Dagh, to the confines of Baluchistan and Sind.

76. 8. 7. 20. Skin, mounted. Mount Ararat, Asia Minor. *Presented by Commander Telfair, R.N.*, 1876.

76. 8. 7. 12. Skin, mounted. Cilician Taurus, Asia Minor; collected by C. G. Danford, Esq. *Purchased*, 1876.

76. 8. 7. 14. Skin, mounted. Same locality and collector. *Same history.*

76. 8. 7. 13. Skin, mounted, female. Same locality and collector. *Same history.*

76. 8. 7. 1. Skeleton, with horns, mounted. Same locality and collector. *Same history.*

76. 8. 7. 2. Skeleton, with horns, female. Same locality and collector. *Same history.*

76. 8. 7. 11. Skull, young. Same locality and collector. *Same history.*

75. 6. 61. Skin, mounted. Capillan Capan, Solyman Mountains, Asia Minor; same collector. *Purchased*, 1875.

52. 5. 19. 1. Skin, mounted. Erzerum, Asia Minor. *Presented by Messrs. Dickson and Ross*, 1852.

55. 12. 26. 155. Skull, with vertex cut away. Erzerum. *Same donor*, 1855.

50. 5. 19. 1. Skin, mounted. Ala Dagh, Asia Minor. *Purchased*, 1850.

50. 5. 19. 2. Skin, mounted, immature. Same locality. *Purchased*, 1850.

43. 5. 15. 2. Horns. Asia Minor. *Presented by Prof. Edward Forbes*, 1843.

74. 11. 21. 24. Horns, immature. Persia. *Presented by Dr. W. T. Blanford*, 1874.

50. 5. 19. 3. Skull, with horns. Locality unknown. *Purchased*, 1850.

653, *y-z*. Two pairs of horns. Locality unknown;

described by Hamilton Smith as *C. caucasica*. In the first the horns measure 48¼ inches in length by 8¾ in girth, with a tip-to-tip interval of 13⅞ inches. *No history.*

8. 4. 10. 2. Skin. Palang Koh, Southern Seistan.
Presented by Major R. L. Kennion, 1908.

B.—Capra hircus blythi.

Capra blythi, *Hume*, *Proc. Asiat. Soc. Bengal*, 1874, p. 240.
Capra ægagrus, *Blanford*, *Fauna Brit. India*, *Mamm.* p. 502, 1891.
Capra hircus blythi, *Lydekker*, *Wild Oxen*, *Sheep*, *and Goats*, p. 264, 1898, *Game Animals of India*, *etc.* p. 108, 1907, *Cat. Hume Bequest Brit. Mus.* p. 12, 1913; *Ward*, *Records of Big Game*, ed. 6, p. 378, 1910.

Typical locality Sind.

This race was named, without description, in order to distinguish it from *C. severtzowi* (at that time not separated

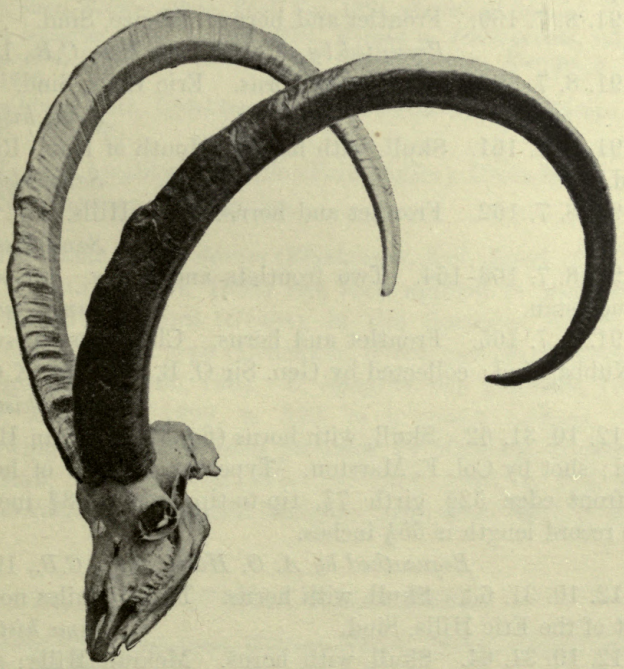

Fig. 39.—Skull and Horns of Sind Wild Goat (*Capra hircus blythi*).
From Ward's *Records of Big Game*.

from *C. caucasica*), with which it had previously been confounded. It differs from the Caucasian and Persian wild goat *C. h. ægagrus*, by its smaller size, the slight development, or even absence, of the knobs on the front edge of the horns, which are more closely approximated at the tips, and apparently also by the paler ground-colour of the coat.

Fine horns have much the same measurements as those of *ægagrus*, the maximum length recorded in 1910 being 50 inches. The range includes Baluchistan; but whether the wild goat of the Kopet Dagh, between Persia and Turkestan, belongs to this or the preceding race remains to be determined.

56. 9. 22. 9. Skull, with horns. Probably from Sind; collected by Gen. Abbott. *Purchased*, 1856.

91. 10. 7. 3. Skull, with horns, and scalp, female. Khirthar Range, Sind. *Presented by Dr. W. T. Blanford*, 1891.

91. 8. 7. 159. Frontlet and horns. Monze, Sind. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 160. Skull, with horns. Eric Hills, Sind. *Same history.*

91. 8. 7. 161. Skull, with horns. Mouth of Habb River, Sind. *Same history.*

91. 8. 7. 162. Frontlet and horns. Eric Hills. *Same history.*

91. 8. 7. 163–164. Two frontlets and horns. Lusbeila, Baluchistan. *Same history.*

91. 8. 7. 165. Frontlet and horns. Chiltun, south-west of Nubba, Sind; collected by Gen. Sir O. B. St. John, K.C.B. *Same history.*

12. 10. 31. 62. Skull, with horns (fig. 39). Surjan Hills, Sind; shot by Col. F. Marston. Type (?). Length of horns on front edge $52\frac{3}{8}$, girth $7\frac{7}{8}$, tip-to-tip interval $8\frac{3}{4}$ inches. The record length is $55\frac{1}{2}$ inches. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

12. 10. 31. 63. Skull, with horns. Twenty miles north-west of the Eric Hills, Sind. *Same history.*

12. 10. 31. 64. Skull, with horns. Mekran Hills; shot by J. Stupp, Esq. *Same history.*

C.—Capra hircus cretensis.

Capra ægagrus cretensis, *Lorenz* (ex *Brisson*), *Mitt. Bosnia u. Herzegovina*, vol. vi, p. 881, 1899; *Bate*, *Proc. Zool. Soc.* 1905, vol. ii, p. 323; *Trouessart*, *Faune Mamm. Europe*, p. 239, 1910.

Capra hircus cretensis, *Lydekker*, *Great and Small Game of Europe*, *etc.* p. 156, 1901.

Capra ægagrus, *Slater*, *Proc. Zool. Soc.* 1886, pl. xxxi.

Typical locality Crete.

A small imperfectly known goat, which may or may not be pure-blooded.

5. 12. 2. 36. Skin and horns. Spharkia, Western Crete; collected by Miss D. M. A. Bate. *Purchased*, 1905.

74. * * *. Skin, mounted, female. Crete. *Purchased*, 1874.

D.—Capra hircus picta.

Ægoceros pictus, *Erhard*, *Fauna Cycladen*, p. 29, 1858.

Capra picta, *Sclater*, *Proc. Zool. Soc.* 1874, pl. 689, pl. lviii.

Capra ægagrus picta, *Lorenz*, *Mitt. Bosnia u. Herzegovina*, vol. vi, p. 854, 1899; *Trouessart*, *Cat. Faune Mamm. Europe*, p. 238, 1910.

Capra hircus picta, *Lydekker*, *Great and Small Game of Europe*, *etc.* p. 158, 1901.

Typical locality Antimilo (Erimomilos), Cyclades.

No specimen in collection.

The name *Capra dorcas* (Reichenow, *Zool. Jahrb. Abt. für. Syst.* vol. iii, p. 594, 1888) has been applied to goats from the Island of Joura (*Giura*), in the Sporades, which are of a domesticated type (Lydekker, *Great and Small Game of Europe*, *etc.*, pp. 160, 190). *C. ægagrus*, var. *jourensis*, Ivrea, *Proc. Zool. Soc.* 1899, p. 599, is a *nomen nudum*. The following names have been proposed by Matschie, *C. persica*, Laristan, *Waidwerk* in *Wort u. Bild*, 1905, p. 174, and *C. florstedti* and *C. cilicica*, Bulghar Dagh, *ibid.* 1907, p. 237.

IX. CAPRA FALCONERI.

Ægoceros (Capra) falconeri, *Wagner*, *Münch. gelehrt. Anzeig.* vol. ix, p. 430, 1839.

Capra falconeri, *Wagner*, *Hügel's Kaschmir*, vol. iv, p. 579, 1848; *Blanford*, *Journ. Asiat. Soc. Bengal*, vol. xliv, p. 17, 1875,

Fauna Brit. India, Mamm. p. 505, 1891; *Scully, Proc. Zool. Soc.* 1881, p. 209; *Sclater, ibid.* 1886, p. 317; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 145, 1891; *Ward, Records of Big Game*, p. 236, 1896, ed. 6, p. 360, 1910; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 286, pl. xxv, 1898, *Game Animals of India, etc.* p. 121, 1907, *Cat. Hume Bequest, Brit. Mus.* p. 14, 1913; *Trubeckoi, Prir. i. Ochota Moskva*, vol. xxxviii, p. 40, 1910.

Ægoceros falconeri, *Wagner, Schreber's Säugthiere, Suppl.* vol. iv, p. 499, 1844.

Hircus megaceros, *Adams, Proc. Zool. Soc.* 1858, p. 525.

Capra megaceros, *Jerdon, Mamm. Ind.* p. 291, 1861; *Kinloch, Large Game Shooting*, pt. i, p. 37, 1869; *Sterndale, Mamm. Ind.* p. 441, 1884.

Hircus falconeri, *Gray, Cat. Ruminants Brit. Mus.* p. 53, 1872, *Hand-List Ruminants Brit. Mus.* p. 126, 1873.

Capra (Orthagoceros) falconeri, *Trouessart, Cat. Mamm. Suppl.* p. 738, 1905.

MARKHOR.

Typical locality Astor. Type of *Orthagoceros.*

All the forms of wild goats with horns twisted in screw-like or corkscrew-like fashion are included under this specific title; the variation in the shape of the horns being taken for the basis of division into local races, at least some of which appear to intergrade.

Size typically large (41 inches at shoulder), and build heavy. Horns forming an upwardly directed, more or less divergent, open heteronymous spiral; situated close together at base, compressed with a sharp keel in front, which sweeps outwards at starting, and another behind. Beard very large and profuse, extending backwards and downwards to form a heavy fringe on throat and chest. Coat long and silky in winter, with little or no under-fur. General colour (typically) grey in winter, rich reddish brown in summer, but in old males whitish; under-parts lighter than back; a dark stripe on front of fore-legs from knees to fetlocks, and on corresponding part of hind legs; beard black in front, greyish fawn behind; tail dark brown.

The five named races are chiefly distinguished by the form of the horns, as described under their respective headings.

The distributional area extends from Bokhara through Chitral, Gilgit, Afghanistan, Astor, etc., to the Western Himalaya.

A.—Capra falconeri falconeri.

Capra falconeri typica, *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 288, 1908; *Ward*, *Records of Big Game*, ed. 6, p. 360, 1910.
Capra falconeri falconeri, *Lydekker*, *Cat. Hume Bequest Brit. Mus.* p. 15, 1913.

Typical locality Astor.

In this, the typical, race the horns (fig. 40) form a more open spiral and are more divergent than in any of the others; maximum recorded length on outside curve 60 inches.

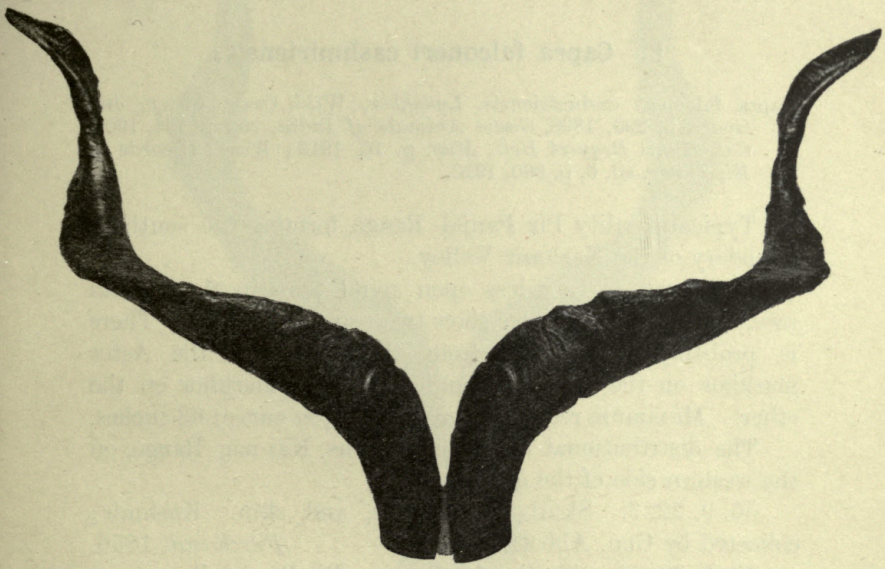

Fig. 40.—Frontlet and Horns of Astor Markhor (*Capra falconeri falconeri*).
From Ward's *Records of Big Game*.

91. 3. 5. 1. Head, mounted. Datchkot, Indus Valley. *Presented by Capt. M. Murphy*, 1891.

96. 7. 6. 1. Skin, mounted. Baltistan. *Purchased*, 1896.

88. 3. 20. 12. Skulls, with horns, immature. Astor. *Presented by R. Lydekker, Esq.*, 1888.

12. 10. 31. 55. Frontlet and horns (fig. 40), Astor. In this specimen, which stands No. 43 in Ward's list, the horns

measure 49 inches in length along the curve, 35 inches in a straight line, and 14 in girth, with a tip-to-tip interval of 44 inches. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

12. 10. 31. 54. Skull and horns, provisionally referred to this race. In Mr. Hume's MS. list this specimen is stated to come from Astor; but in Ward's list, where it stands No. 18, the locality—on Mr. Hume's own statement—is given as uncertain. The horns measure 54¼ inches along the curve and 10½ in girth, with a tip-to-tip interval of 26½ inches. *Same history.*

B.—Capra falconeri cashmiriensis.

Capra falconeri cashmiriensis, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 290, 1898, *Game Animals of India, etc.* p. 124, 1907, *Cat. Hume Bequest Brit. Mus.* p. 16, 1913; *Ward, Records of Big Game*, ed. 6, p. 360, 1910.

Typical locality Pir Panjal Range, forming the southern boundary of the Kashmir Valley.

The horns form a less open spiral than in the typical race, and in fine examples show two complete spirals. There is probably a gradation from this race into the Astor markhor on the one hand and the Cabul markhor on the other. Maximum recorded horn-length (on curve) 63 inches.

The distributional area includes the Kaj-nag Range, on the western side of the Jhelam.

56. 9. 22. 3. Skull, with horns, and skin. Kashmir; collected by Gen. Abbott. *Purchased*, 1856.

88. 3. 20. 11. Skull, with horns. Pir Punjal Range. *Presented by R. Lydekker, Esq.*, 1888.

56. 6. 6. 60. Skull, with horns, immature. Kashmir. *Presented by Dr. T. Oldham*, 1856.

91. 8. 7. 145. Skull, with horns. Uri, Jhelam Valley, below Kashmir. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 146. Skull, with horns, immature. *Same history.*

79. 11. 21. 33. Immature horns, provisionally referred to this race. Stated to be from Afghanistan, but more probably from the Pir Panjal; collected by Dr. H. Falconer. *Transferred from India Museum*, 1879.

12. 10. 31. 56. Skull, with horns (fig. 41), Pir Panjal.

This specimen is No. 53 in Ward's list. The horns measure 48 inches along the curve, $37\frac{3}{4}$ in a straight line, and $12\frac{3}{4}$ in

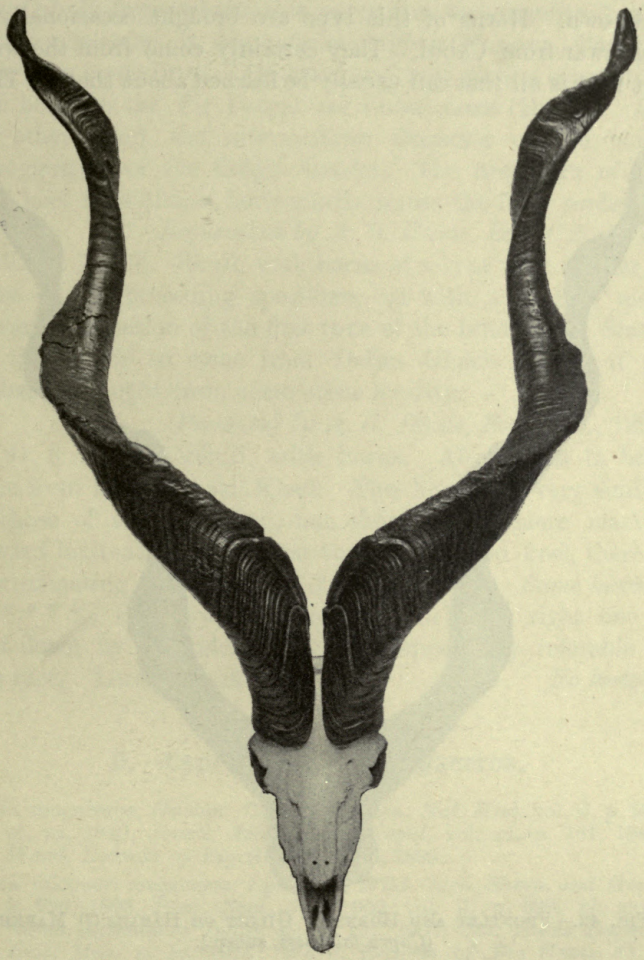

FIG. 41.—SKULL AND HORNS OF PIR PANJAL MARKHOR (*Capra falconeri cashmiriensis*).
From Ward's *Records of Big Game.*

girth, with a tip-to-tip interval of 21 inches. The record length for this race is 63 inches.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

C.—*Capra falconeri*, subsp.

12. 10. 31. 86. Frontlet and horns (fig. 42). Locality unknown. Horns of this type are brought occasionally to Peshawar from Cabul. They certainly come from the west, but that is all that can usually be learned about them. They

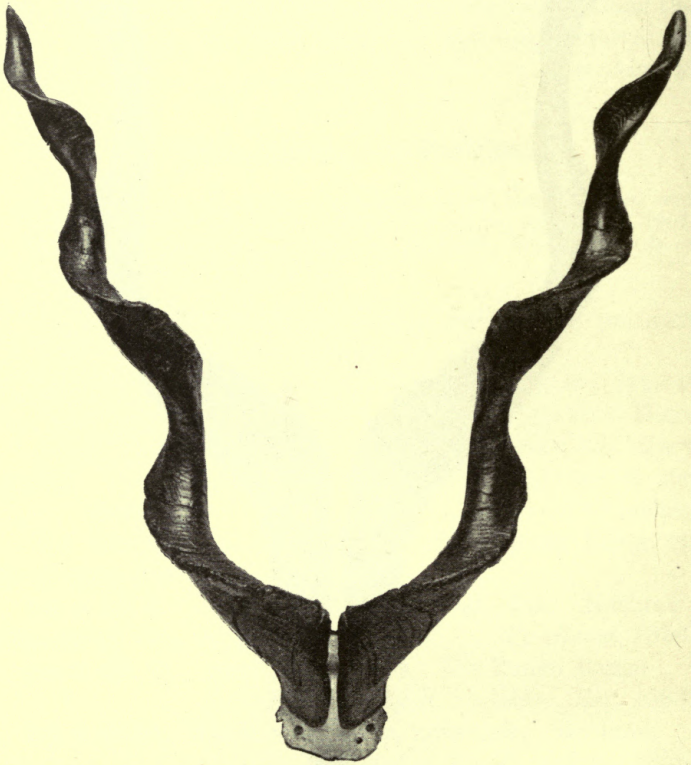

FIG. 42.—FRONTLET AND HORNS OF GILGIT OR HAZARA (?) MARKHOR (*Capra falconeri*, subsp.).
From Ward's *Records of Big Game.*

belong to the corkscrew group, but differ from those of the preceding races in being much slenderer, and in the greater number of turns of the main ridge in any given length measured from base to tip. In this respect they are to Pir Panjal and Astor horns what Suleman horns are to those of

Cabul. The horns make a regular V, broader or narrower, but the tip-to-tip measurement never apparently exceeds the straight length, and usually falls at least one-sixth short. The Cabuli from whom this specimen was purchased said that he believed it came from Afghan Hazara. Possibly they may come from Kafiristan, and may form a connecting link between the Pir Panjal and Cabul races (Hume). On the other hand, the intermediate character of the horns is suggestive of the Gilgit district. The first turn of the hind keel runs almost horizontally across the front surface.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

91. 8. 7. 134. Skull, with horns of a type very similar to those of the preceding specimen, but with a slightly more upward inclination of the first turn of the hind keel. Stated by the donor to come from Dehra Ghazi Khan; if so, probably brought from some other locality.

Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 137. Skull, with horns. Also stated to have come from Dehra Ghazi Khan. The horns are very similar to those of the preceding, but show a still more marked upward inclination of the first turn of the hind keel, thereby approximating to the type of *C. f. megaceros*. *Same history.*

* * * *. Skull, with horns, of which the right one is bent down by the side of the face, apparently referable to this race. Locality unknown. *No history.*

D.—Capra falconeri megaceros.

Capra megaceros, *Hutton, Calcutta Journ. Nat. Hist.* vol. ii, p. 535, pl. xx, 1842, *Journ. Asiat. Soc. Bengal*, vol. xv, p. 161, 1846; *Ward, Records of Big Game*, p. 236, 1896.

Capra falconeri megaceros, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 293, 1898, *Proc. Zool. Soc.* 1902, vol. ii, p. 323, pl. xxvii, *Game Animals of India, etc.* p. 127, 1907, *Cat. Hume Bequest, Brit. Mus.* p. 18, 1913; *Ward, Records of Big Game*, ed. 6, p. 367, 1910.

Typical locality northern Afghanistan.

The markhor inhabiting the mountain ranges of Northern Afghanistan forms another stage in the gradation from the Astor to the Suleman race, its horns being intermediate between those of the latter and those of the Pir Panjal race.

In full-grown bucks, although nearly straight, they form a slightly open spiral, or, in other words, show a tendency towards the corkscrew type so conspicuous in the preceding races. It is probable that a complete gradation may be

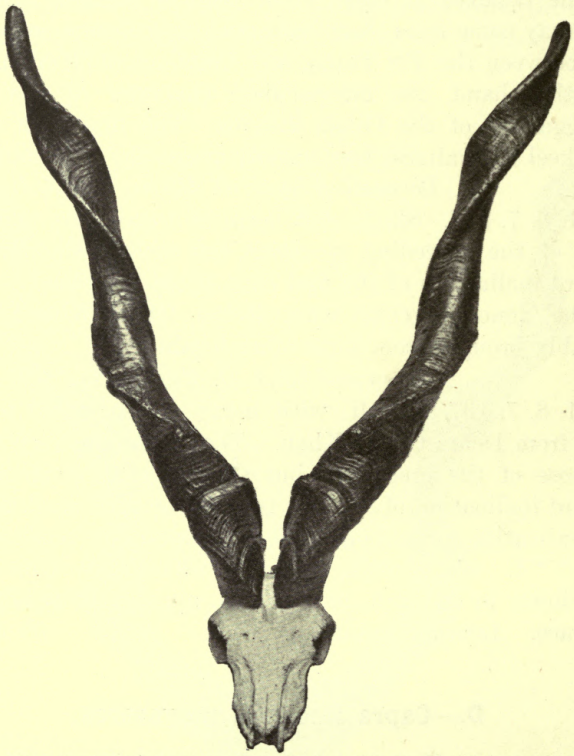

FIG. 43.—SKULL AND HORNS OF CABUL MARKHOR (*Capra falconeri megaceros*).
From Ward's *Records of Big Game.*

found from the Pir Panjal to the Suleman type by means of the present form, especially as represented in Chitral.

79. 6. 12. 1. Skull, with horns, and skin. Afghanistan. No. 2 in Ward's list of horns of this and next race. Length of horns in straight line $39\frac{3}{4}$, girth $10\frac{1}{4}$, tip-to-tip interval 24 inches. *Presented by Col. Grant*, 1879.

91. 8. 7. 144. Skull, with horns. Chilul Tau, near Quetta, Baluchistan.

Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 138. Skull, with horns. Quetta; collected by Gen. Sir O. B. St. John, K.C.B. *Same history.*

98. 8. 7. 141. Immature skull, with horns. Same locality and collector. *Same donor.*

98. 8. 7. 142–143. Two female skulls, with horns. Same locality and collector. *Same donor.*

12. 10. 31. 51. Skull and horns (fig. 43). Afghanistan. In this specimen, which stands No. 12 in Ward's list, the horns measure 32 inches in a straight line and 10 in girth, with a tip-to-tip interval of 27½ inches.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

2. 10. 14. 1. Skin, mounted. Chitral. As in other Chitral specimens, the horns present an approximation to those of *f. cashmiriensis.* Figured *Proc. Zool. Soc.* 1902, vol. ii, pl. xxvii. *Purchased*, 1902.

11. 10. 10. 2. Head, mounted. Chitral.

Presented by Capt. R. A. Lyall, 1911.

7. 10. 11. 1–2. Two skulls, with horns. Chitral.

Presented by the Mehtar of Chitral, 1907.

782, *b*. Single horn. Probably from Astor. Length on curve 46½, girth 11½ inches. *Presented by Dr. H. Falconer.*

E.—Capra falconeri jerdoni.

Capra jerdoni, *Hume, Proc. Asiat. Soc. Bengal*, 1874, p. 240; *Kinloch, Large Game Shooting*, pt. ii, p. 15, 1876; *Ward, Records of Big Game*, p. 239, 1896.

Capra falconeri jerdoni, *Lydekker, Wild Oxen, Sheep, and Goats*, p. 294, 1898, *Game Animals of India, etc.* p. 130, 1907, *Cat. Hume Bequest Brit. Mus.* p. 18, 1913; *Ward, Records of Big Game*, ed. 6, p. 367, 1910.

Typical locality Suleman Range, Trans-Indus district of Punjab.

In the markhor of the Suleman and other Trans-Indus districts, including some of the hills in the neighbourhood of Quetta, the horns are relatively short and form a regular straight cone, on the surface of which the front and hind keels are wound in a sharp spiral, forming in good specimens two to three complete spirals. The bodily size is less than in the typical and Pir Panjal races.

3. 2. 20. 1. Head, mounted. Sheik Budin, Suleman Range. *Presented by the Duke of Bedford, K.G.*, 1903.

11. 12. 24. 1. Head, mounted. Sheik Budin. *Presented by Major R. L. Kennion*, 1911.

FIG. 44.—SKULL AND HORNS OF SULEMAN MARKHOR (*Capra falconeri jerdoni*).
From Ward's *Records of Big Game.*

47. 12. 31. 1. Skull, with horns. Trans-Indus district. *Presented by the Hon. East India Company*, 1847.

91. 8. 7. 135. Skull, with horns. Dehra Ismail Khan, Suleman Range. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 136. Skull, with horns. Dehra Ghazi Khan, Suleman Range. *Same history.*

91. 8. 7. 139. Skull, with horns. Mount Fukatu.
Same history.

91. 8. 7. 140. Skull, with horns. North-eastern Swat.
Same history.

It is probable that either one or other of the two following specimens, or one of those presented to the Museum by Mr. Hume in 1891, is the type of this race:—

12. 10. 31. 52. Skull, with horns. Dehra Ghazi Khan. In this specimen, which stands No. 22 in Ward's list, the length of the horns in a straight line is $26\frac{3}{4}$ inches, the girth $11\frac{1}{4}$, and the tip-to-tip interval $22\frac{1}{16}$ inches.
Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 53. Skull and horns (fig. 44). Dehra Ismail Khan. Length of horns $24\frac{3}{4}$ inches. *Same history.*

781, *i*. Single horn. Locality unknown. Stands first in Ward's list of specimens of this and next race; length $48\frac{1}{2}$, girth $7\frac{3}{4}$ inches. *No history.*

56. 9. 22. 3. Skull, with horns, and skin. "Paghine"; collected by Gen. Abbott. *Purchased*, 1856.

56. 9. 22. 4. Horns. Hills near Peshawar; same collector. *Same history.*

91. 8. 7. 147. Skull, with horns. Quetta; collected by Gen. Sir O. B. St. John, K.C.B. Said to be a wild cross between *C. f. jerdoni* and *C. hircus ægagrus;* and if so, of importance in connection with the belief in the existence of wild hybrids between *C. caucasica* and *C. severtzowi.*
Presented by A. O. Hume, Esq., C.B., 1891.

The race of the following specimen is undetermined:—

65. 12. 8. 9. Skin, and skeleton. Locality unknown.
Presented by the Zoological Society, 1865.

F.—Capra falconeri chialtanensis, subsp. n.

Horns forming an open spiral of rather more than one complete turn, with the front and hind keels ascending at a high angle in such a manner that at the completion of the first turn the hind keel is situated on the inner border of horn, whereas in all other markhor the front keel occupies

this position, the hind keel being external. The horns are also noticeable for the flatness of the inner surface, which is

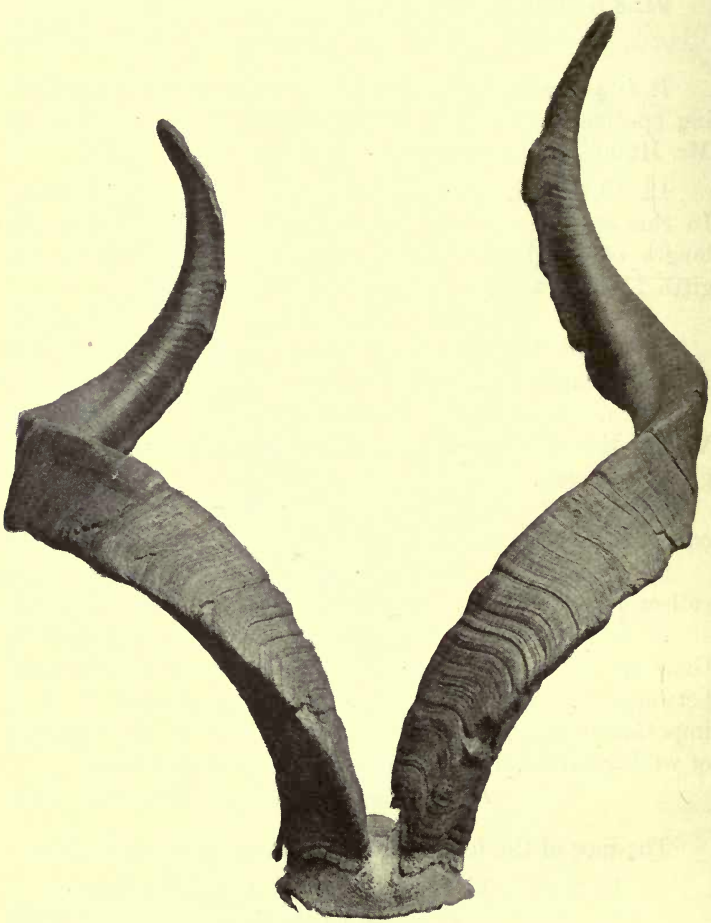

FIG. 45.—FRONTLET AND HORNS OF CHIALTAN MARKHOR (*Capra falconeri chialtanensis*).

slightly concave along the middle line. The race is believed to be extinct.

Typical locality, the Chialtan Range, near Quetta, Baluchistan, which is completely surrounded by low desert, and attains an altitude of 10,300 feet.

13. 3. 15. 1. Frontlet and horns (fig. 45). This specimen,

which is the type, was given to Colonel Appleton in 1882 by a local shikari, who had recently shot the animal to which it belonged on Chialtan. Length of horns, on outer curve, 34½, do. in a straight line 26, girth 9, tip-to-tip interval 13½ inches. *Presented by Col. H. Appleton*, 1913.

V. Genus HEMITRAGUS.

Hemitragus, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. x, p. 913, 1841; *Gray, Cat. Ungulata Brit. Mus.* p. 144, 1852, *Cat. Ruminants Brit. Mus.* p. 51, 1872; *Blanford, Fauna Brit. India, Mamm.* p. 508, 1891; *Pocock, Proc. Zool. Soc.* 1910, p. 866.

Kemas, *Gray, Cat. Ungulata Brit. Mus.* p. 146, 1852, nec *Ogilby*.

Horns heteronymous, short, and sweeping backwards in a regular curve; in females not much smaller than in males. Teats, in some cases at any rate, four; tail much as in *Capra;* face-glands and normally foot-glands absent, although there may occasionally be vestiges of the latter in the hind-feet. No beard on chin in males, which in winter and early spring exhale a strong odour, differing from that of goats and recalling the smell of cormorants and frigate-birds.*

The distribution includes the outer and middle ranges of the Himalaya, the Nilgiri, Anamalai, and certain other south Indian ranges, and the mountains of south-eastern Arabia.

The three species may be distinguished as follows:—

A. Horns compressed with flattened sides and a sharp front keel.
  a. Size large, horns strongly ridged and knotted ... *H. jemlahicus*.
  b. Size smaller, horns with slighter ridges and knots ..... *H. jayakari*.

B. Horns with the inner surface nearly flat and the outer highly convex, a low compressed ridge on inner front edge, and the posterior surface rounded ..... *H. hylocrius*.

I. HEMITRAGUS JEMLAHICUS.

Capra jemlanica (jemlahica on plate), *H. Smith, Griffith's Animal Kingdom*, vol. iv, p. 308, 1827; *Sclater, Proc. Zool. Soc.* 1886, p. 317.

Capra jemlahica, *H. Smith, op. cit.* vol. v, p. 358, 1827; *Jardine, Nat. Libr. Mamm.* vol. iv, p. 117, 1836.

* Pocock, *loc. cit.*

Capra jharal, *Hodgson, Asiatic Researches*, vol. xviii, pt. 2, p. 129, 1833, *Proc. Zool. Soc.* 1834, p. 106, *Journ. Asiat. Soc. Bengal*, vol. iv, p. 491, 1835.

Capra quadrimammis, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. iv, p. 710, 1835, vol. v, p. 254, 1836.

Hemitragus quadrimammis, *vel* jharal, *Hodgson, op. cit.* vol. x, p. 913, 1841.

Hemitragus jemlaicus, *Gray, Cat. Osteol. Brit. Mus.* p. 60, 1847, *Knowsley Menagerie*, p. 32, 1850, *Cat. Ungulata Brit. Mus.* p. 144, 1852, *Cat. Ruminants Brit. Mus.* p. 51, 1872, *Hand-List Ruminants Brit. Mus.* p. 122, 1873; *Adams, Proc. Zool. Soc.* 1858, p. 532; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 247, 1862; *Jerdon, Mamm. Ind.* p. 286, 1867; *Blanford, Journ. As. Soc. Bengal*, vol. xli, p. 40, 1872, *Fauna Brit. India, Mamm.* p. 509, 1891; *Kinloch, Large Game Shooting*, p. ii, pt. 11, 1876; *Lydekker, Journ. Asiat. Soc. Bengal*, vol. xlvi, p. 286, 1877, *Wild Oxen, Sheep, and Goats*, p. 298, 1898, *Game Animals of India, etc.* p. 134, 1907, *Cat. Hume Bequest Brit. Mus.* p. 21, 1913; *Ward, Records of Big Game*, p. 233, 1896, ed. 6, p. 355, 1910; *Pocock, Proc. Zool. Soc.* 1910, p. 866.

Kemas jemlaicus, *Gervais, Hist. Nat. Mamm.* vol. ii, p. 188, 1855.

Capra (Hemitragus) jemlaicus, *Sterndale, Mamm. Ind.* p. 449, 1884.

Capra jemlaica, *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* p. ii, p. 250, 1884; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 146, 1891.

TAHR.

Typical locality Jemla Hills, Nepal.

Size large (shoulder-height 36 to 40 inches); build somewhat heavy; face long, narrow, and straight. Horns, which are nearly in contact at base, compressed, flattened on each side, with the lateral surfaces transversely ridged, and the front inner edge forming a sharp nodose keel. Head short-haired, but hair of body long and shaggy, especially on neck and fore-quarters, where it forms a heavy mane, reaching to knees. General colour rich reddish or dark brown, darkest in old males, in which the fore part of the mane is often hoary or whitish; face and front of legs dark or blackish brown; a dark more or less distinct dorsal stripe; hind surfaces of legs rusty red. Under side of tail bare; knees and chest with callous pads; four teats.

The distributional area includes the forest-districts of the middle ranges of the Himalaya from the Pir Punjal to Sikhim, but apparently does not embrace the Kaj-Nag, to the west of the Jhelam, or the mountains on the northern side of the Kashmir Valley.

11. 6. 4. 1. Skin, mounted. Himalaya.
Presented by the Zoological Society, 1911.

96. 11. 21. 1. Skin, formerly mounted. Himalaya.
Presented by the Duke of Bedford, K.G., 1896.

91. 10. 7. 167. Skin. Sikhim; collected by L. Mandelli, Esq. *Presented by Dr. W. T. Blanford*, 1891.

45. 1. 8. 322–323. Two skins, mounted. Nepal, Himalaya. The number of the second may be 327.
Presented by B. H. Hodgson, Esq., 1845.

45. 1. 8. 324 (or [?] 39. 7. 25. 17). Skin, immature, mounted. *Same history.*

55. 1. 20. 2. Skin, immature. Himalaya.
Presented by H.H. Maharaja Dhuleep Sing, 1855.

886, *i*. Skull, with horns. Jemla, Western Nepal. Type; figured by Hamilton Smith, *op. cit.* *No history.*

42. 4. 10. 4. Skull, with horns. Himalaya. Figured in Gray's 1852 "Catalogue." *Purchased*, 1842.

886, *c*. Skull, with horns, female. Himalaya. *No history.*

56. 5. 6. 75. Skull, with horns, female. Kashmir.
Presented by Dr. T. Oldham, 1856.

8. 2. 29. 2. Skull, with horns, female. Tolma Nala, British Garhwal. *Presented by Dr. T. G. Longstaff*, 1908.

91. 8. 7. 121. Head and horns. Near Kulu.
Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 122–123. Two skulls, with horns. Kumaon.
Same history.

91. 8. 7. 124. Horns. Hills above Kulu. *Same history.*

91. 8. 7. 125. Horns. Garhwal. *Same history.*

91. 8. 7. 126. Horns. Rampur, Sutlej Valley.
Same history.

91. 8. 7. 127. Skull, with horns, female. Mula-Danpur, Kumaon; collected by N. Troup, Esq. *Same history.*

12. 10. 31. 45. Skull, with horns. Kumaon. This specimen stands No. 9 in Ward's list. Length of horns $14\frac{1}{8}$, girth $8\frac{7}{8}$, tip-to-tip $6\frac{5}{8}$ inches. The record length is $15\frac{1}{2}$ inches. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

12. 10. 31. 46. Skull, with horns. Mula-Danpur, Kumaon; collected by Mr. Troup. *Same history.*

12. 10. 31. 47. Skull, with horns. Mula-Danpur; collected by Mr. Troup. *Same history.*

79. 11. 21. 34. Skull, with horns. Himalaya.
Transferred from India Museum, 1879.
45. 1. 8. 184. Skull, with horns, female. Nepal.
Presented by B. H. Hodgson, Esq., 1845.
45. 1. 8. 185. Skull, young. Nepal. *Same history.*
45. 1. 12. 466. Skeleton, wanting skull. Nepal.
Same history.
45. 1. 12. 466, *a*. Skeleton, immature, wanting skull.
Same history.
62. 3. 19. 6. Skeleton, menagerie specimen.
Presented by the Zoological Society, 1862.
88. 3. 20. 13. Horns. Chinab Valley, Chumba.
Presented by R. Lydekker, Esq., 1888.
45. 1. 8. 186. Horns. Nepal.
Presented by B. H. Hodgson, Esq., 1845.
45. 1. 8. 187. Horns, female. Nepal. *Same history.*
45. 1. 8. 188. Horns, young. Nepal. *Same history.*
886, *o*. Horns. Locality unknown. *Purchased* (*Argent*).
79. 11. 21. 32. Horns. Himalaya.
Transferred from India Museum, 1879.
886, *j*. Horns. Himalaya. *No history.*
886, *b*. Horns. Himalaya. *In collection in* 1838.
38. 10. 11. 19. Horns, female. Himalaya.
Purchased, 1838.

II. HEMITRAGUS JAYAKARI.

Hemitragus jayakari, *Thomas*, *Ann. Mag. Nat. Hist.* ser. 6, vol. xiii, p. 365, 1894, *Proc. Zool. Soc.* 1894, p. 452, pl. xxxi; *Ward*, *Records of Big Game*, p. 234, 1896, ed. 6, p. 357, 1910; *Lydekker*, *Wild Oxen, Sheep, and Goats*, p. 301, 1898, *Great and Small Game of Europe, etc.* p. 174, 1901.

Arabian Tahr.

Typical locality Jebel Taw, Oman, south-east Arabia.

Size small (shoulder-height about 24½ inches), and build relatively slender. Horns relatively longer, more slender, less strongly ridged on sides, and less knotted on front keel than in typical species. Hair coarse, shaggy, and brittle, shorter, and not developed into a mane covering the whole of fore-quarters; general colour pale sandy or whitish brown, with black tips to hairs of dorsal crest; face, lower part of

cheeks, back of ears, tail, and a fetlock-band black or blackish. In the male, at any rate, two teats.

94. 3. 9. 11. Skin, mounted. Jebel Taw, Oman. Paratype. *Presented by Lieut.-Col. A. S. G. Jayaker*, 1894.

94. 3. 9. 12. Skin. Jebel Taw. Type. *Same history.*

III. HEMITRAGUS HYLOCRIUS.

Kemas hylocrius, *Ogilby, Proc. Zool. Soc.* 1837, p. 81; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 254, 1884.

Capra (Ibex) warryato, *Gray, Ann. Mag. Nat. Hist.* ser. 1, vol. x, p. 267, 1842.

Capra warryato, *Gray, List. Mamm. Brit. Mus.* p. 168, 1843.

Kemas warryato, *Gray, Cat. Ungulata Brit. Mus.* p. 146, 1852, *Cat. Ruminants Brit. Mus.* p. 51, 1872, *Hand-List Ruminants Brit. Mus.* p. 122, 1873; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 246, 1862.

Hemitragus hylocrius, *Blyth, Journ. Asiat. Soc. Bengal*, vol. xxviii, p. 291, 1859; *Jerdon, Mamm. Ind.* p. 288, 1867; *MacMaster, Notes on Jerdon's Mamm.* p. 117, 1870; *Blanford, Fauna Brit. India, Mamm.* p. 511, 1891; *Ward, Records of Big Game*, p. 231, 1896, ed. 6, p. 350, 1910; *Lydekker, Wild Oxen, Sheep, and Goats*, p. 303, 1898, *Game Animals of India, etc.* p. 137, 1907, *Cat. Hume Bequest Brit. Mus.* p. 22, 1913; *Fletcher, Sport on the Nilgiris*, p. 303, pl. 1911.

Capra (Hemitragus) hylocrius, *Sterndale, Mamm. Ind.* p. 451, 1884.

Capra hylocrius, *Sclater, Proc. Zool. Soc.* 1886, p. 318; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 146, 1891.

Nilgiri Tahr.

Typical locality Nilgiri Hills, southern India.

Size and build much the same as in *jemlaicus;* shoulder-height 39 to 42 inches. Horns transversely wrinkled throughout their length, with inner surface nearly flat and outer highly convex, a low compressed keel on front inner edge, and hind surface rounded. Profile irregular. General colour dark yellowish brown, with a dark dorsal stripe and paler under-parts; but in old males dark sepia-brown above, passing into blackish on face, with a ring round and a patch behind the eye, as well as a band on side of face, fawn-colour, a conspicuous grizzled or whitish saddle-patch, and legs, which are paler behind, also grizzled.

The distributional area includes the chief mountain ranges of southern India, namely the Nilgiris, Anamalais, and Western Ghats from the Anamalais nearly to Cape Comorin.

13. 4. 3. 1. Skin, mounted. Nilgiris.
Presented by the Hon. Sir Arthur Lawley, G.C.I.E., K.C.M.G.

63. 7. 8. 1. Skin, mounted. Nilgiris.
Presented by H. MacGregor, Esq., 1863.

55. 12. 24. 291. Skin, mounted, female. Nilgiris. Type.
Transferred from Zoological Society's Museum, 1855.

42. 2. 24. 2. Head, mounted, female. Nilgiris. This and the next specimen are co-types of *C. warryato.*
Presented by R. Partridge, Esq., 1842.

42. 2. 24. 1. Skull. Nilgiris. *Same history.*

87. 12. 22. 3. Skull, female. Kunhas Hills, Nilgiris.
Presented by St. George Littledale, Esq., 1887.

91. 8. 7. 128. Skull, with horns. Near Utacamund, Nilgiris. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 129–130. Two skulls, with horns, female. Near Utacamund. *Same history.*

91. 8. 7. 131–132. Two skulls, with horns. Northern Travancore Hills. *Same history.*

12. 10. 31. 48. Mounted head. Near Utacamund; collected by Rhodes Morgan, Esq. In this specimen, which stands No. 3 in Ward's list, the horns measure $16\frac{3}{4}$ inches in length and $8\frac{7}{8}$ in girth, with a tip-to-tip interval of $5\frac{5}{8}$ inches. The record length is $17\frac{1}{2}$ inches.
Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 50. Skull, with horns. Travancore Hills; collected by A. W. Turner, Esq. Length of horns $13\frac{1}{8}$ inches.
Same history.

12. 10. 31. 49. Skull, with horns. Near Utacamund; collected by Mr. Morgan. *Same history.*

Subfamily iii.—RUPICAPRINÆ.

Somewhat goat-like ruminants, with cheek-teeth of a caprine type, and horns present in both sexes and relatively large in the females. The horns, which lack the front keel of *Hemitragus* and *Capra falconeri* and the knots of the Ibex group, may be either simply conical and recurved or hooked, or bent outwards and then upwards, with a pronounced hind-keel at base. Foot-glands and face-glands present or absent;

teats usually four; a larger or smaller bare area on muzzle; lateral hoofs, as in preceding subfamilies, always developed. Tail usually short, but longer, with a terminal tuft, in some species of *Nemorhœdus*. Ears long or short, narrow or broad.

The group ranges over the mountain regions of southern and south-eastern Europe, Asia Minor, the Himalaya, China, Japan, Formosa, and north-western North America.

The genera may be distinguished as follows:—

A. Muffle large; horns conical, inclining backwards without terminal hook.
  a. Face-glands present ..... *Capricornis*.
  b. Face-glands wanting ..... *Nemorhœdus*.
B. Muffle small.
  a. A pair of glands behind horns.
    a'. Horns conical, strongly hooked backwards at tip; colour dark ..... *Rupicapra*.
    b'. Horns conical, inclining backwards, without terminal hook; colour white ..... *Oreamnos*.
  b. No glands behind horns.
    Build heavy; horns massive, keeled, bent outwards, then slightly downwards, and finally upwards ..... *Budorcas*.

I. Genus RUPICAPRA.

Rupicapra, *Blainville*, *Bull. Soc. Philom.* 1816, p. 75; *Pocock*, *Proc. Zool. Soc.* 1910, p. 848; *Miller*, *Cat. Mamm. W. Europe Brit. Mus.* p. 992, 1912.

Capella, *Keyserling and Blasius*, *Wirbelth. Europ.* p. iv, 1840; *Blasius*, *Säugeth. Deutschl.* p. 487, 1857.

Cemas, *Gloger*, *Gemein. Hand- u. Hilfsbuch. Naturgesch.* vol. i, p. 153, 1841, nec *Oken*.

Build lighter than in *Capra*; no beard; cannon-bones long and slender. Horns rising almost vertically, with the tips sharply but regularly hooked, so that they point backwards, downwards, and slightly outwards. Muffle small, tail short. Shallow foot-glands, approximating to the gazelline rather to the ovine type; no face-glands, but a pair of post-cornual glands in the male; four teats. Skull with facial portion moderately bent downwards, and occipital region not distinctly tubular behind; no lachrymal pits; nasal branch of premaxillæ not touching nasals; teeth of the *Ovis* type, but crowns of incisors shorter; terminal

ridges on outer surface of upper premolars distinct, but median ridge obsolete. The distributional area includes the mountains of southern Europe from the Asturias and

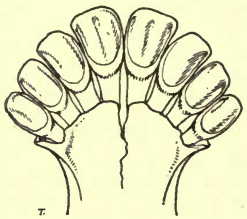

Fig. 46.—Lower Incisors and Canines of Chamois (*Rupicapra rupicapra*).

From Miller's *Cat. Mamm. West. Europe*, p. 993.

Pyrenees, through the Alps, Apennines, and Carpathians, to the Caucasus, and thence to those of Asia Minor.

RUPICAPRA RUPICAPRA.

Capra rupicapra, *Linn. Syst. Nat.* ed. 10, vol. i, p. 68, 1758, ed. 12, vol. i, p. 95, 1766; *var. a.* sylvatica, *var. b.* alpina, *Sundevall, K. Svenska Vet.-Ak. Handl.* 1845, p. 284, 1847.

Antilope rupicapra, *Pallas, Spicil. Zool.* fasc. xi, p. 42, 1767–80.

Antilope (Rupicapra) rupicapra, *Blainville, Bull. Soc. Philom.* 1816, p. 75; *H. Smith, Griffith's Anim. Kingdom*, vol. iv, p. 281, vol. v, p. 353, 1827.

Rupicapra hamulicornis, *Burnett, Quart. Journ. Sci. Lit. Art.* 1829, pt. 2, p. 353.

Rupicapra tragus, *Gray, List Mamm. Brit. Mus.* p. 167, 1843, *Cat. Ungulata Brit. Mus.* p. 116, 1852, *Cat. Ruminants Brit. Mus.* p. 41, 1872, *Hand-List Ruminants Brit. Mus.* p. 112, 1873; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 242, 1862; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.*, pt. ii, p. 256, 1884; *Flower and Lydekker, Study of Mammals*, p. 349, 1891; *Lydekker, Game Animals of Europe, etc.* p. 176, 1901; *Ward, Records of Big Game*, ed. 6, p. 337, 1910.

Rupicapra capella, *Bonaparte, Atti Riun. Sci. Ital.* 1844, p. 337.

Capella rupicapra, *Keyserling and Blasius, Wirbeltk. Europ.* p. iv, 1840; *Blasius, Säugeth. Deutschl.* p. 488, 1857; *Brehm, Tierleben*, ed. 3, *Säugeth.* vol. iii, p. 402, 1891.

Rupicapra europæa, *Cornalia, Fauna Ital.* p. 53, 1870.

Rupicapra dorcas, *Schulze, Abh. u. Vorträge Gesammtb. Naturwiss.* vol. iv, No. 10, p. 9, 1897.

Rupicapra rupicapra, *Weber, Säugetiere*, p. 674, 1904; *Pocock, Proc. Zool. Soc.* 1910, p. 848; *Trouessart, Faune Mamm. Europe*, p. 235, 1910; *Miller, Cat. Mamm. W. Europe Brit. Mus.* p. 993, 1912

Chamois, Gems, or Izard.

Typical locality Switzerland.

Height at shoulder normally about 32 inches; general colour tawny brown in summer, blackish brown in winter, with flanks usually darker than under-parts; a dark dorsal stripe present in some individuals; a conspicuous buffish white throat-patch.

A.—Rupicapra rupicapra rupicapra.

Typical locality Swiss Alps.

General characters those given under head of species, but neck never decidedly paler on upper and lower surfaces than on sides. Horns almost vertical, with the bases of their cores sufficiently well apart to allow for the presence of a flattened or double concave area on surface of frontal between. Basal length of skull $7\frac{1}{2}$–$8\frac{3}{4}$ inches (190–207 mm.); length of upper row of cheek-teeth $2\frac{1}{16}$–$2\frac{5}{16}$ inches (52–59 mm.).

Measurements of seven skulls are given by Miller, *op. cit.*, p. 987.

The distributional area includes the Alps, Tyrol, part of the Apennines, and the Carpathians.

81. 9. 21. 1. Skin, mounted. Tyrol.
Presented by H.R.H. the Crown Prince Rudolf of Austria, 1881.

78. 6. 20. 1–2. Two skeletons, with horns, one immature. Tyrol. *Same donor*, 1878.

6. 2. 15. 1. Skin, mounted. South Carpathians. The colour is very dark, as is commonly the case in Carpathian specimens.
Presented by St. George Littledale, Esq., 1906.

631, *g*. Skeleton. Locality unknown; collected by Dr. Brandt. *Purchased.*

86. 12. 27. 1. Skin and skeleton. Hatszeg, South Carpathians; collected by C. G. Danford, Esq. *Purchased*, 1886.

46. 7. 7. 2. Skull, with horns. Alps.
Presented by J. Gould, Esq., 1846.

46. 10. 13. 31–33. Three frontlets, with horns, and detached horns. Alps. *Presented by Dr. J. E. Gray*, 1846.

631, *a. b.* Two skulls, with horns. Alps.
Bequeathed by Gen. T. Hardwicke, 1835.

631,*d. e. m.* Three skulls, or frontlets, with horns. Locality unknown. *Purchased.*

67. 4. 12. 221. Skull, with horns. Locality unknown. *Lidth de Jeude Collection, purchased,* 1867.

59. 9. 6. 102. Skull, with horns. Alps; collected by Dr. A. Günther. *Purchased,* 1859.

51. 8. 30. 2. Skull, immature. Alps; collected by Baker. *Purchased,* 1852.

94. 6. 26. 2. Fœtus, in spirit. Hatszeg, South Carpathians; collected by C. G. Danford, Esq. *Purchased,* 1894.

B.—Rupicapra rupicapra fæsula.

Rupicapra fæsula, *Miller, Proc. Biol. Soc. Washington,* vol. xxv, p. 131, 1912.

Typical locality Savio Valley, Etruscan Apennines.

Resembles typical race in colouring, but differs by its larger teeth; the length of the upper series of cheek-teeth being from 62 to 64 mm., against 56·6 to 59 mm. in the former; the corresponding dimensions in the lower teeth being from 64 to 68 mm. against 57 to 61·4 mm.

No specimen in collection.

C.—Rupicapra rupicapra ornata.

Rupicapra ornata, *Neumann, Ann. Mus. Genova,* ser. 2, vol. xx, p. 347, 1899; *Trouessart, Faune Mamm. Europe,* p. 235, 1910; *Miller, Cat. Mamm. W. Europe Brit. Mus.* p. 994, 1912.

Rupicapra tragus ornata, *Lydekker, Great and Small Game of Europe, etc.* p. 183, 1901; *Ward, Records of Big Game,* ed. 6, p. 338, 1910.

Typical locality Abruzzi Apennines.

The type specimen is in the Genoa Museum.

General colour similar to that of typical race, but light throat-patch extending downward nearly to brisket, and dorsal surface of neck almost or quite as pale; the two pale areas separated along side of neck by a dark line extending from base of ear downwards and forwards to join its fellow of opposite side above brisket. Horns inclining more backward than in typical race. Basicranial length $7\frac{3}{16}$ inches (190 mm.); length of upper series of cheek-teeth $2\frac{3}{16}$ inches (56 mm.).

4. 2. 29. 1. Skin. Abruzzi. Italy.

By exchange with the Genoa Museum, 1904.

D.—Rupicapra rupicapra pyrenaica.

Rupicapra pyrenaica, *Bonaparte*, *Atti Riun. Scien. Ital.* 1844, p. 337; *Miller*, *Cat. Mamm. W. Europe Brit. Mus.* p. 995, 1912.

Rupicapra tragus pyrenaica, *Lydekker*, *Field*, vol. cxii, p. 104, 1908; *Ward*, *Records of Big Game*, ed. 6, p. 338, 1910.

Rupicapra rupicapra pyrenaica, *Cabrera*, *Proc. Zool. Soc.* 1910, p. 998.

Typical locality Pyrenees.

Colour in winter less dark than in typical race; neck-markings much the same as in *ornata;* horns, which rise almost perpendicularly, more approximated than in other races, with the space between them slightly concave; cheek-teeth relatively small. Basicranial length $7\frac{1}{2}$ inches (190 mm.); length of upper series of cheek-teeth $2\frac{3}{16}$ inches (56 mm.).

48. 2. 5. 7. Skin, mounted. Pyrenees. *Purchased*, 1848.

E.—Rupicapra rupicapra parva.

Rupicapra rupicapra parva, *Cabrera*, *Proc. Zool. Soc.* 1910, p. 999.

Rupicapra parva, *Miller*, *Cat. Mamm. W. Europe Brit. Mus.* p. 995, 1912.

Typical locality Picos de Europa, Santander, Spain.

Stated to be smaller and darker than *pyrenaica*, with the throat-patch ill-defined and scarcely lighter than the general body-colour. The distribution includes the Cantabrian Range of Spain. The type specimen is in Madrid Museum.

97. 1. 7. 3. Skin mounted. Picos de Europa.
Presented by J. W. R. Lee, Esq., 1897.

F.—Rupicapra rupicapra caucasica.

Rupicapra tragus caucasica, *Lydekker*, *Ward's Records of Big Game*, ed. 6, p. 338, 1910.

Typical locality Caucasus.

Horns of male relatively short and thick, rising nearly vertically, and with only moderate divergence. Nasal bones without distinct lachrymal process, and a small persistent lachrymal fissure present; in the west European races there is a small lachrymal process to the nasals, and the lachrymal fissure obliterates early. Throat-patch large, whitish above,

and orange inferiorly; orange patches on light area of face above nose and eyes, as well as behind tip of chin, and whole of that area, but more especially the part at base of horns

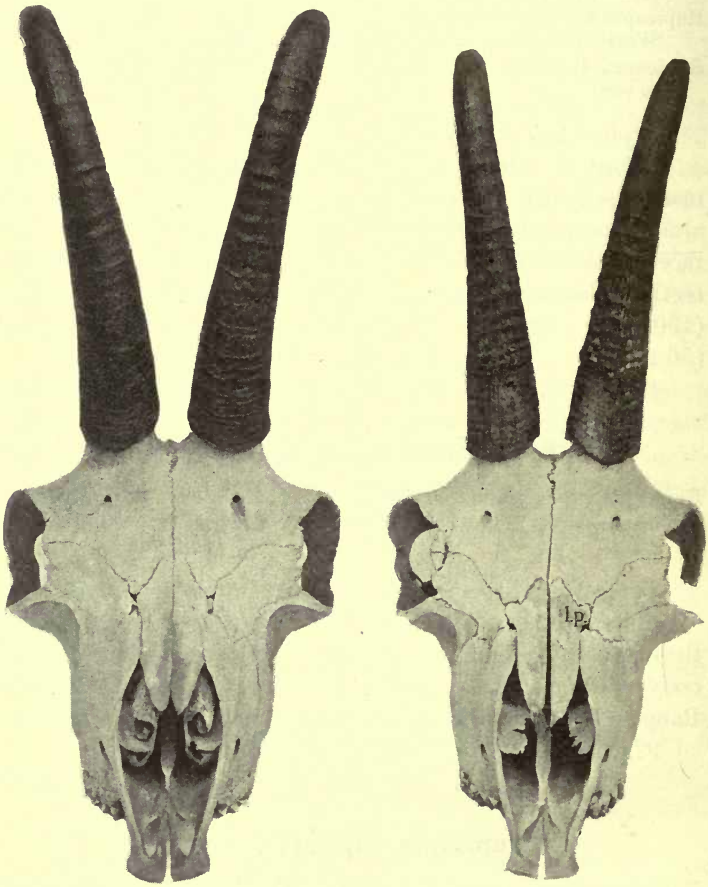

FIG. 47.—SKULL AND HORNS OF (A) CAUCASIAN (*Rupicapra rupicapra caucasica*), AND (B) ASIA MINOR (*R. r. asiatica*) CHAMOIS; the former showing the absence, and the latter the strong development of the lachrymal process (*l.p.*) of nasals.

markedly paler than in Carpathian examples of typical race Basicranial length $7\frac{3}{16}$ inches (189 mm.); length of upper row of cheek-teeth $2\frac{7}{16}$ inches (60 mm.); maximum width of nasals $\frac{3}{16}$ inches (22 mm.).

79. 11. 15. 2. Skin, mounted. Caucasus.
By exchange with the Warsaw Museum, 1879.

8. 3. 13. 1. Head, mounted. Caucasus.
Presented by B. P. Van der Byle, Esq., 1908.

87. 5. 5. 1. Skull and skin, female. Western Caucasus; collected by St. George Littledale, Esq. *Purchased*, 1887.

92. 3. 16. 8. Skeleton. Caucasus; collected by St. George Littledale, Esq. Type. The skull (fig. 47 A) shows the nasal and cornual features mentioned above.
Purchased, 1892.

92. 3. 16. 5. Skull, female, with horns, and skin probably belonging to same individual. Caucasus; same collector.
Purchased, 1892.

92. 3. 16. 6. Skull, with horns, immature. Caucasus; same collector. *Purchased*, 1892.

92. 3. 16. 7. Skull, with horns. Caucasus; same collector.
Purchased, 1892.

92. 3. 16. 9. Skull, with horns, immature. Caucasus; same collector. *Purchased*, 1892.

8. 12. 10. 3. Skull and skin, immature. Eastern Caucasus.
Presented by St. George Littledale, Esq., 1908.

G.—Rupicapra rupicapra asiatica.

Rupicapra tragus asiatica, *Lydekker*, *Field*, vol. cxii, p. 104, 1908; *Ward*, *Records of Big Game*, ed. 6, p. 338, 1910.

Typical locality Trebizond, Asia Minor.

General colour darky, smoky brown, with a broad black dorsal stripe; neck and limbs blackish brown, much darker than in most forms of typical race; light area of face relatively small, with the frontal portion dull chestnut. In immature specimens the general colour is light brown, with a narrow and distinct dorsal stripe. Horns relatively small and thin. Nasals with a strongly marked lachrymal process (fig. 47 B); a large and persistent lachrymal fissure. Basicranial length $7\frac{3}{8}$ inches (187 mm.); length of upper series of cheek-teeth $2\frac{3}{8}$ inches (60 mm.); maximum width of nasals $1\frac{1}{6}$ inches (28 mm.).

6. 3. 6. 223. Skull, with right horn, and skin, old male. Scalita, Trebizond; collected by A. Robert, Esq. Exhibits

very clearly the nasal and cornual features mentioned above. *Presented by O. Thomas, Esq.*, 1906.

6. 3. 6. 234. Skeleton. Same locality and collector. *Same history.*

6. 3. 6. 180. Skull, with horns, and skin. Sumela, Trebizond; same collector. This and next specimen exhibit above-mentioned cranial characters very distinctly. *Same history.*

6. 3. 6. 181. Skull, with horns, and skin. Sumela; same collector. Type (fig. 47 B). *Same history.*

6. 3. 6. 182. Skull, with horns, and skin, female. Sumela; same collector. *Same history.*

6. 3. 6. 183. Skull, with horns, and skin. Same collector. *Same history.*

6. 3. 6. 184. Imperfect skull, with right horn, and skin, female. Same locality and collector. *Same history.*

6. 3. 6. 222. Skull, with horns, and skin. Scalita; same collector. *Same history.*

6. 3. 6. 179. Skull, with left horn, and skin, immature. Sumela; same collector. *Same history.*

II. Genus CAPRICORNIS.

Næmorhedus, *H. Smith, Griffith's Anim. Kingdom*, vol. v, p. 352, 1827, in part (*vide infra*, p. 202).

Capricornis, *Ogilby, Proc. Zool. Soc.* 1836, p. 138; *Gray, List Mamm. Brit. Mus.* pp. xxvi and 166, 1843; *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. ii, pp. 222 and 234, 1894; *Pocock, Ann. Mag. Nat. Hist.* ser. 8, vol. i, p. 187, 1908, *Proc. Zool. Soc.* 1910, p. 174; *Lydekker, Cat. Hume Bequest Brit. Mus.* p. 28, 1913.

Nemorhœdus, *Jerdon, Mamm. India*, p. 283, 1867.

Nemorhædus, *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 254, 1884; *Blanford, Fauna Brit. India, Mamm.* p. 512, 1891; *Lydekker, Great and Small Game of India, etc.* p. 128, 1900, *Game Animals of India, etc.* p. 139, 1907.

Capricornulus, Nemotragus, Lithotragus, Austritragus, *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. iv, pp. 13, 14, 1898.

Build rather heavier than in *Rupicapra*, size typically medium; cannon-bones long and slender. Horns rising more or less nearly in the plane of the face, and curving regularly but slightly backwards, with a distinct outward divergence; marked with irregular transverse ridges, broken

up by longitudinal striæ. Muffle large; tail short and hairy. Foot-glands (at least typically) and small face-glands present; four teats. Skull relatively deep with facial portion moderately bent downwards, occipital surface

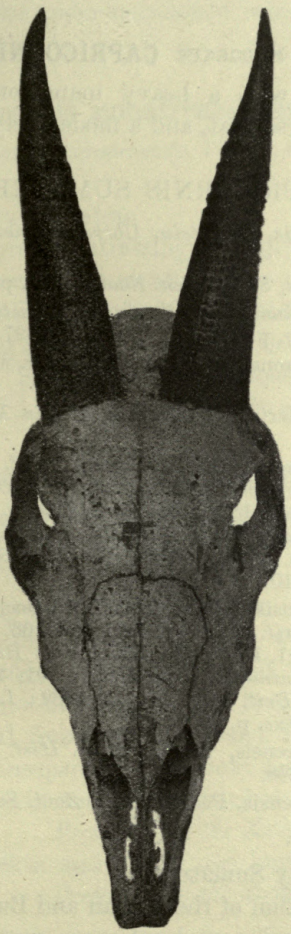

FIG. 48.—SKULL AND HORNS OF SZE-CHUAN SEROW (*Capricornis sumatrensis milne-edwardsi*).
Proc. Zool. Soc. 1908.

forming an obtuse angle with parietal plane, and nasal branch of premaxillæ not reaching nasals; large but shallow lachrymal pits, which are more or less truncated superiorly.

The distributional area comprises a large portion of

south-eastern and eastern Asia, extending from the Himalaya to the mountains of Sze-chuan, Kan-su, and other parts of China, Tonkin, Burma, the Malay Peninsula, Sumatra, Japan, and Formosa.

1. Subgenus CAPRICORNIS.

Large serows, with a heavy mane on neck, big ears, comparatively sparse coat, and a moderately bushy tail.

I. CAPRICORNIS SUMATRENSIS.

Antilope sumatraensis, *Bechstein*, *Übersicht vierfüss. Thiere*, vol. i, p. 98, 1799.

Antilope sumatrensis, *Shaw*, *Gen. Zool.* vol. ii, pt. 2, p. 354, 1801.

Antilope (Nemorhedus) sumatrensis, *H. Smith*, *Griffith's Anim. Kingdom*, vol. iv, p. 277, vol. v, p. 352, 1827.

Næmorhædus sumatrensis, *Jardine*, *Nat. Libr. Mamm.* vol. iv, p. 97, 1836.

Antilope interscapularis, *Lichtenstein*, *Berlin Mag.* vol. vi, p. 165, 1814.

Nemorhædus sumatrensis, *Cantor*, *Journ. Asiat. Soc. Bengal*, vol. xv, p. 272, 1846; *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 254, 1884; *Blanford*, *Fauna Brit. India, Mamm.* p. 314; *Lydekker*, *Game Animals of India, etc.* p. 139, 1907, *Proc. Zool. Soc.* 1908, p. 940; *Ward*, *Records of Big Game*, ed. 6, p. 345, 1910.

Capricornis sumatrensis, *Ogilby*, *Proc. Zool. Soc.* 1836, p. 138; *Gray*, *List Mamm. Brit. Mus.* pp. xxvi and 166, 1843, *Cat. Ungulata Brit. Mus.* p. 111, 1852, *Cat. Ruminants Brit. Mus.* p. 20, 1872, *Hand-List Ruminants Brit. Mus.* p. 91, 1873; *Gerrard*, *Cat. Bones Mamm. Brit. Mus.* p. 241, 1862; *Lydekker*, *Cat. Hume Bequest Brit. Mus.* p. 23, 1913.

Austritragus sumatrensis, *Heude*, *Mém. Hist. Nat. Emp. Chinois*, vol. iv, p. 14, 1898.

Capricornis sumatraensis, *Pocock*, *Proc. Zool. Soc.* 1910, p. 176.

Serow, or Sarao.

Typical locality Sumatra.

The identification of the Indian and Burmese serows with the Sumatran species, as local races, was suggested by the present writer in 1900, this view being provisionally adopted (*Proc. Zool. Soc.*, 1908, p. 175), but subsequently abandoned (*Ibid.* 1910, p. 855) by Pocock.

The type species.—Size large, shoulder-height reaching 37 or 38 inches. Colour variable, ranging from wholly black except for some grey in the mane, to wholly rufous, but in

many of the dark-backed races the shanks white, dirty white or rufous, and some whitish grey or rufous in mane, which seems to be never mainly white. Foot-glands present; under-fur present or absent.

Whether all the under-mentioned races are valid cannot yet be determined.

A.—Capricornis sumatrensis sumatrensis.

Capricornis sumatraensis sumatraensis, *Pocock*, *Proc. Zool. Soc.* 1910, p. 190.

Typical locality Sumatra.

Mane hoary grey, contrasting strongly with dark body-coat; no sharp line of demarcation between colour of upper and lower portions of legs, which is blackish below knees and hocks, shading into dark brown on fetlocks.

53. 8. 29. 25. Skin, mounted. Sumatra.
Presented by Sir Stamford Raffles, 1853.

B.—Capricornis sumatrensis robinsoni.

Capricornis sumatraensis robinsoni, *Pocock*, *Proc. Zool. Soc.* 1910, p. 185.
Nemorhædus sumatrensis robinsoni, *Ward*, *Records of Big Game*, ed. 6, p. 346, 1910.

Typical locality Selangor, Malay Peninsula.

Closely allied to typical race, from which it apparently differs by the mane being less abundant on the withers and less grey in colour. Skull unusually long and narrow, with shallow lachrymal fossæ, and elongated, transversely convex nasals. May be inseparable from next race.

6. 11. 14. 1. Skin and skull, with horns. Selangor. Type.
Presented by the Zoological Society, 1906.

13. 3. 9. 1. Skin and skull, one horn missing. Malay Peninsula. *Presented by the Zoological Society*, 1913.

C.—Capricornis sumatrensis swettenhami.

Nemorhædus swettenhami, *Butler*, *Proc. Zool. Soc.* 1900, p. 675.
Nemorhædus sumatrensis swettenhami, *Lydekker*, *Game Animals of India, etc.* p. 147, 1907; *Ward*, *Records of Big Game*, ed. 6, p. 346, 1910.
Capricornis sumatraensis swettenhami, *Pocock*, *Proc. Zool. Soc.* 1910, p. 186.

Typical locality Larut Hills, Perak, Malay Peninsula.

Nearly related to the last, but (typically) distinguished by the presence of a considerable amount of red hair in mane, and in the light patch on the fore part of lower jaw, some white hairs also occurring in mane.

3. 2. 6. 77. Skin. Bigerat, Malay Peninsula. Type. *Presented by Messrs. H. C. Robinson and N. Annandale*, 1903.

91. 2. 1. 1. Horns, belonging to this or an allied race. Perak. *Presented by Sir Hugh Low*, 1891.

10. 10. 1. 107. Skull, with horns. Sungei Letue, Malay Peninsula. *Presented by H. C. Robinson, Esq.*, 1910.

D.—Capricornis sumatrensis milne-edwardsi.

Capricornis milne-edwardsi, *David, Arch. Mus. Paris*, vol. v, *Bull.* p. 10, 1869.

Næmorhedus edwardsii, *David, Arch. Mus. Paris*, vol. vii, *Bull.* p. 90, 1871.

Antilope (Næmorhedus) edwardsii, *Milne-Edwards, Rech. Mamm.* p. 364, 1874.

Nemorhedus edwardsii, *Anderson, Zool. Yunnan Exped.* p. 335, 1878.

Nemorhœdus edwardsii, *Sterndale, Mamm. India*, p. 487, 1886.

Nemorhædus sumatrensis milne-edwardsi, *Lydekker, Game Animals of India, etc.* p. 143, 1907, *Proc. Zool. Soc.* 1908, p. 943.

Capricornis sumatraensis milne-edwardsi, *Pocock, Proc. Zool. Soc.* 1908, p. 175.

Capricornis sumatrensis milne-edwardsi, *Allen, Bull. Mus. Harvard*, vol. xl, p. 203, 1912; *Lydekker, Cat. Hume Bequest Brit. Mus.* p. 25, 1913.

Typical locality Moupin, Sze-chuan, China.

Characterised by the rufous shanks, coupled with the uniformly blackish brown colour of the whole of the upper-parts; the mane being a mixture of grey and black hairs, and under-parts dirty dark brown.

The distributional area extends through Yun-nan to Burma.

12. 10. 31. 38. Skull, with horns. Tho Toungyen Valley, above Myawadi, Burma.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 39. Frontlet and horns. Pabya Hill (600 ft.), 76 miles S.S.W. of Moulmein, Lower Burma. *Same history.*

12. 10. 31. 40. Frontlet and horns. Dorngin Hill, north of Moulmein. *Same history.*

91. 8. 7. 107. Pair of horns. Mount Muleyit, Burma; collected by Lieut.-Col. C. T. Bingham.

Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 108–113. Six skulls, with horns. Tenasserim. *Same history.*

11. 9. 8. 139. Skin and skull, with horns. Si-ho Valley, western Sze-chuan; collected by M. P. Anderson, Esq.

Presented by the Duke of Bedford, K.G., 1911.

67. 5. 12. 2. Skin, mounted. Zwagaben Mountain ("Duke of York's Nose"), 25 miles north of Moulmein, Burma. Noticed in *Proc. Zool. Soc.*, 1866, p. 4.

Presented by Lieut. R. C. Beavan, 1867.

56. 5. 6. 78. Skull. Pegu; collected by William Theobald, Esq. *Presented by Dr. T. Oldham*, 1856.

8. 10. 9. 10. Skin, mounted. Sze-chuan.

Presented by J. W. Brooke, Esq., 1908.

8. 10. 9. 13. Skull, with horns, and scalp-skin, female (fig. 48). Sze-chuan. Described by present writer, *P. Z. S. op. cit.* The dimensions are as follows:—

Extreme basal length	11 inches.
„ zygomatic width	5¼ „
Length of nasals	4⅛ „
Width of nasals	2⅛ „

Same history.

11. 9. 8. 139. Skull, with horns, female. Wen-chwan-hsien, Si-ho Valley, western Sze-chuan; collected by M. P. Anderson, Esq.

Presented by the Duke of Bedford, K.G., 1911.

E.—Capricornis sumatrensis jamrachi.

Capricornis sumatraensis jamrachi, *Pocock, Proc. Zool. Soc.* 1908, p. 183.

Capricornis thar jamrachi, *Pocock, op. cit.* 1910, p. 855.

Nemorhædus sumatrensis jamrachi, *Ward, Records of Big Game*, ed. 6, p. 346, 1910.

Typical locality Kalimpong, near Darjiling.

General colour of head and upper-parts deep black, with some brownish yellow behind white of upper lip and at base

and on back of ears; white of chin not continued backwards to throat, which lacks a distinct patch, the chest being also black; under-parts dirty greyish brown; knees, fetlocks, and pasterns white, but hair overlying cannon-bones tinged with fawn or rusty yellow; on a line from tail to stifle the black of hind-quarters passes into the rusty brown of outer and surfaces of hind legs, which in turn fades to yellowish brown as far down as white fetlocks; coat short, with practically no under-fur.

The absence of white, except on fetlocks, knees, inner sides of ears, upper lip, and chin, is distinctive of this race, which is nearly related to the last.

2. 10. 12. 1. Skin, mounted. Kalimpong, near Darjiling. Type. *Presented by the Duke of Bedford, K.G.*, 1902.

88. 3. 20. 14–15. Two skulls, with horns, probably referable to this species. Kursiong.

Presented by R. Lydekker, Esq., 1898.

F.—Capricornis sumatrensis rubidus.

Capricornis rubida, *Blyth, Cat. Mamm. Mus. Asiat. Soc. Bengal*, p. 174, 1863.

Nemorhedus rubida, *Anderson, Zool. Yunnan Exped.* p. 336, 1878.

Nemorhædus rubida, *Sterndale, Mamm. India*, p. 456, 1886.

Nemorhædus sumatrensis rubidus, *Lydekker, Great and Small Game of India*, p. 131, 1900, *Game Animals of India, etc.* p. 143, 1907; *Ward, Records of Big Game*, ed. 6, p. 346, 1910.

Capricornis sumatraensis rubidus, *Pocock, Proc. Zool. Soc.* 1908, p. 175.

Capricornis sumatrensis rubidus, *Lydekker, Cat. Hume Bequest Brit. Mus.* p. 25, 1913.

Typical locality Arakan.

Distinguished by the prevailing red colour of the coat.

12. 10. 31. 36. Skull, with horns. Arakan; collected by J. D. Mercer, Esq. This specimen is the record for this race, the length of the horns being 9½, the girth 5, and the tip-to-tip interval 5½ inches.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 37. Skull, with horns. Same locality and collector. *Same history.*

91. 8. 7. 104–6. Three skulls, with horns, and one skin. Arakan. *Presented by A. O. Hume, Esq., C.B.*, 1891.

G.—Capricornis sumatrensis thar.

Antilope thar, *Hodgson*, *Gleanings in Science*, vol. iii, p. 324, 1831, *Journ. Asiat. Soc. Bengal*, vol. i, p. 346, 1832, vol. iv, p. 489, 1835, *Proc. Zool. Soc.* 1833, p. 105; *Owen*, *ibid.* 1836, p. 37.

Antilope bubalina, *Hodgson*, *Proc. Zool. Soc.* 1832, p. 12.

Antilope (Nemorhedus) thar, *Hodgson*, *Proc. Zool. Soc.* 1834, p. 86.

Capricornis thar, *Ogilby*, *Proc. Zool. Soc.* 1836, p. 138; *Pocock*, *Ann. Mag. Nat. Hist.* ser. 8, vol. i, p, 178, 1908, *Proc. Zool. Soc.* 1910, p. 855, *Journ. Bombay Nat. Hist. Soc.* vol. xix, p. 823, 1910.

Kemas proclivus *vel* thar, *Hodgson*, *Journ. Asiat. Soc. Bengal*, vol. x, p. 913, 1841, *Calcutta*, *Journ. Nat. Hist.* vol. iv, p. 291, 1844.

Capricornis bubalina, *Gray*, *List Mamm. Brit. Mus.* p. 166, 1843, *Cat. Ungulata Brit. Mus.* p. 111, 1852, *Cat. Ruminants Brit Mus.* p. 20, 1872, *Hand-List Ruminants Brit. Mus.* p. 91, 1873; *Horsfield*, *Cat. E. Indian Mus.* p. 168, 1851, *Proc. Zool. Soc.* 1856, p. 403; *Adams*, *Proc. Zool. Soc.* 1858, p. 522; *Gerrard*, *Cat. Bones Mamm. Brit. Mus.* p. 241, 1862; *Blyth*, *Cat. Mamm. Mus. Asiat. Soc. Bengal*, p. 174, 1863.

Nemorhœdus bubalina, *Jerdon*, *Mamm. Ind.* p. 283, 1867; *Blanford*, *Journ. Asiat. Soc. Bengal*, vol. xli, pt. 2, p. 40, 1872; *Sterndale*, *Mamm. Ind.* p. 454, 1884.

Nemorhedus bubalina, *Anderson*, *Zool. Yunnan Exped.* p. 335, 1878.

Nemorhædus bubalinus, *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 254, 1884; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 149, 1891; *Blanford*, *Fauna Brit. India*, *Mamm.* p. 513, 1891.

Nemorhædus sumatrensis bubalinus, *Lydekker*, *Great and Small Game of India*, p. 128, 1900, *Game Animals of India*, *etc.* p. 139, 1907; *Ward*, *Records of Big Game*, ed. 6, p. 346, 1910.

Capricornis sumatraensis thar, *Pocock*, *Proc. Zool. Soc.* 1908, p. 176, *Journ. Bombay Nat. Hist. Soc.* vol. xix, p. 823, 1910.

Capricornis sumatrensis bubalinus, *Lydekker*, *Cat. Hume Bequest Brit. Mus.* p. 23, 1913.

Typical locality Nepal Himalaya.

Blanford, who pointed out that *thar* is undoubtedly the earliest scientific name for this serow (which is called *thar* in Nepal), expressed the opinion that its use is liable to lead to confusion with the vernacular name of *Hemitragus jemlahicus*.

Head and upper-parts brownish black; under-parts dirty or rufous white; lower portion of legs white or faintly tinged with fawn; throat-patch absent, or represented by a few white hairs, not continuous with the white of the chin; coat relatively thin, with little or no under-fur.

58. 6. 24. 22. Skin, mounted. Nepal.
Presented by B. H. Hodgson, Esq., 1858.

42. 4. 10. 14. Skin, mounted. Nepal; collected by Rev. R. Everest. *Purchased*, 1842.

42. 4. 10. 15. Skin, female, formerly mounted. Same locality and collector. *Purchased*, 1842.

91. 10. 7. 168. Skin, mounted. Sikhim; collected by L. Mandelli, Esq. *Presented by Dr. W. T. Blanford*, 1891.

45. 1. 8. 169–170. Two skulls, with horns. Nepal. *Presented by B. H. Hodgson, Esq.*, 1845.

55. 12. 26. 143. Skull, with horns. Nepal. *Same donor*, 1855.

58. 6. 24. 139. Skull, with horns. Nepal. *Same donor*, 1858.

632, *a*. Frontlet and horns. Locality unknown, and reference therefore provisional. *No history.*

91. 8. 7. 92. Skull, with horns. Kumaon. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 93. Frontlet and horns. Mussoorie. *Same history.*

91. 8. 7. 94. Skull, with horns. Kulu. *Same history.*

91. 8. 7. 96. Frontlet and horns. Rampur, Sutlej Valley. *Same history.*

91. 8. 7. 98. Skull, with horns. Kumaon. *Same history.*

12. 10. 31. 35. Skull, with horns. Garhwal; collected by F. Wilson, Esq. This specimen is the record in the matter of horn-length, which is $12\frac{1}{2}$ inches; the girth of the horns being $6\frac{1}{2}$, and the tip-to-tip interval $2\frac{3}{4}$ inches. *Bequeathed by A. O. Hume, Esq., C.B.*, 1912.

The following specimens may belong either to this race or to *C. s. jamrachi*. It might have been expected that all the Himalayan serows east of Darjiling would belong to the last-named race, but Pocock refers a Sikhim specimen to the present one:—

12. 10. 31. 33. Skull, with horns. Mishmi Hills; collected by J. Needham, Esq. *Same history.*

12. 10. 31. 34. Skull, with horns. Garo Hills, Assam; shot by G. P. Sanderson, Esq., author of *Thirteen Years among the Wild Beasts of India*. *Same history.*

12. 10. 31. 89. Skull, with horns. Same locality and collector. *Same history.*

91. 8. 7. 97. Frontlet and horns. Abor Hills, Mishmi country; collected by J. Needham, Esq. *Presented by A. O. Hume, Esq., C.B.*, 1891.

91. 8. 7. 99–102. Four skulls, with horns. Garo Hills; collected by G. P. Sanderson, Esq. *Same history*

91. 8. 7. 103. Skull, with horns, and skin. Same locality and collector. *Same history.*

H.—Capricornis sumatrensis humei.

Capricornis sumatraensis humei, *Pocock*, *Proc. Zool. Soc.* 1908, p. 178.
Nemorhædus sumatrensis humei, *Ward*, *Records of Big Game*, ed. 6, p. 346, 1910.
Capricornis sumatrensis humei, *Lydekker*, *Cat. Hume Bequest Brit. Mus.* p. 24, 1913.

Typical locality Kashmir.

Distinguished by the entire head being uniformly pale chocolate-brown, without any admixture of black, although there are some black hairs on the fore part of the neck. The sides of the front of the lower jaw are white, but there is no light throat-patch.

91. 8. 7. 95. Mounted head. Kashmir. Type. The length of the horns is $9\frac{3}{4}$, the girth $5\frac{1}{8}$, and the tip-to-tip interval 6 inches. *Presented by A. O. Hume, Esq., C.B.*, 1891.

88. 3. 20. 16. Skull, with horns. Pir Panjal, Kashmir. Described and figured by Pocock, *loc. cit.*, where certain differences, especially the convexity of the fronto-nasal region, the wider palate, and the smaller cheek-teeth, from the typical race, are pointed out.

Presented by R. Lydekker, Esq., 1888.

I.—Capricornis sumatrensis rodoni.

Capricornis sumatraensis rodoni, *Pocock*, *Proc. Zool. Soc.* 1908, p. 181.
Nemorhædus sumatrensis rodoni, *Ward*, *Records of Big Game*, ed. 6, p. 346, 1910.

Typical locality Chamba.

General colour of head and upper-parts brownish black, due to admixture of rufous with black hairs, the rufous tinge extending to middle of mane; lips and chin white, the white of latter extending on to throat, where it forms a conspicuous patch; under-parts (including chest), inner sides of thighs and of upper part of fore-legs, and legs from above knees and hocks downwards pure white, contrasting strongly with rufous of flanks and front of fore-legs; coat relatively long

and thick, with under-fur. There are also certain cranial peculiarities.

2. 12. 11. 1. Skin and skull, with horns. Chamba; collected by Major Roden. Type.

Presented by the Zoological Society, 1902.

Racially Undetermined Specimens.

633, *a*. Frontlet and horns. No locality. *No history.*

67. 4. 12. 224. Skull, immature.

Lidth de Jeude Collection, 1867.

48. 8. 14. 18. Skull, foetal. Locality unknown.

Purchased (*Stevens*), 1848.

FIG. 49.—WHITE-MANED SEROW (*Capricornis argyrochætes*).

II. CAPRICORNIS ARGYROCHÆTES.

Capricornis argyrochætes, *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. ii, p. 4, note, 1888, *ibid.* p. 228, 1894; *Henry, Proc. Zool. Soc.* 1890, p. 93; *Pocock, ibid.* 1910, p. 855; *Allen, Bull. Mus. Harvard*, vol. xl, p. 202, 1912.

Nemotragus argyrochætes, *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. iv, p. 13, 1898; *Pocock, Proc. Zool. Soc.* 1910, p. 856, provisionally.

Nemorhædus argyrochætes, *Lydekker*, *Proc. Zool. Soc.* 1905, vol. ii, p. 329, pl. viii, *ibid.* 1908, p. 940; *Lyon, Smithson. Misc. Collect.* Q. 50, p. 133, 1907.

Capricornis sumatraensis argyrochætes, *Pocock*, *Proc. Zool. Soc.* 1908, pp. 175, 185.

WHITE-MANED SEROW.

Typical locality Che-Kiang, Yang-tsi Valley, Central China. A large species, stated to stand 44 inches at shoulder,*

FIG. 50.—HEAD OF WHITE-MANED SEROW (*Capricornis argyrochætes*), Kan-su.
From a specimen in the collection of Mr. G. Fenwick Owen.

and allied in its type of colouring to *C. sumatrensis sumatrensis* and *C. s. jamrachi*, but with a larger and almost wholly greyish white mane, and the thighs and legs bright ferruginous red. Skull (fig. 51) long and narrow, with unusually long and narrow nasals: the basal length and the nasal length exceeding the corresponding dimensions in a skull of *C. s. milne-edwardsi*, whereas the width of the nasals is less.

* The mounted specimen (not fully adult) stands about 40 inches.

A further difference is to be found in the basisphenoidal region, which is much narrower than in *C. sumatrensis*, while the premaxillæ are also longer and narrower than in the latter.

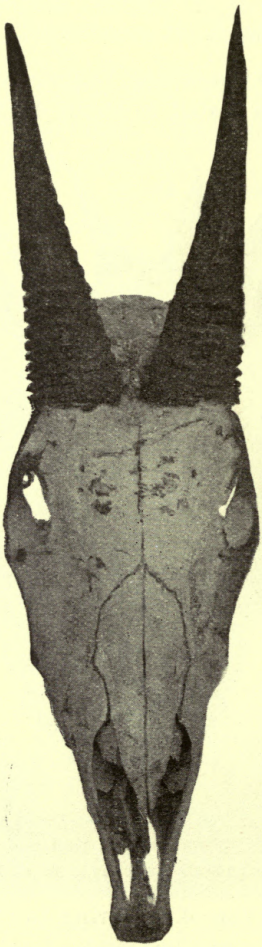

FIG. 51.—SKULL AND HORNS OF WHITE-MANED SEROW (*Capricornis argyrochætes*).
Proc. Zool. Soc. 1908.

Pocock (*op. cit.*, 1910) suggests that foot-glands may be lacking.

The distributional area includes Kan-su and Sze-chuan.

96. 11. 4. 6. Skin, female. Sze-chuan; collected by Berezowski. *By exchange with Tring Museum*, 1896.

5. 11. 30. 3. Skin, mounted, and imperfect skull. Sze-chuan; figured by present writer, *P. S. Z.*, 1908.

Purchased, 1905.

8. 10. 10. 11–12. Two skins and skulls, with horns, male and female. Towquan, sixty miles north of Kanshien, Sze-chuan. The dimensions of the two skulls are as follows:—

	Male (Fig. 51).	Female.
Extreme basal length	12	$11\frac{5}{8}$ inches.
,, zygomatic width	5	$4\frac{3}{4}$,,
Length of nasals	$4\frac{1}{2}$	$4\frac{5}{8}$,,
Width of nasals	$1\frac{1}{2}$	$1\frac{1}{2}$,,

The following measurements of the two animals taken immediately after death were supplied by Mr. Brooke. In taking the measurements the tape is stated to have been laid flat on the body without pulling:—

Male; shot March 30th, 1908.
Height at shoulder from back of foot 44 inches.
Nose to root of tail 68″.
Lip (upper) to horn $11\frac{3}{4}$″.
Ear $8\frac{3}{4}$″ (length), ear 7″ (widest part).
Circumference of hind-leg level with the point where the loose skin from the belly joins the leg 23″.
Widest part of body (*i.e.* just behind withers and over breast-bone under body) $45\frac{1}{4}$″.
Neck where it joins the body 27″.
Narrowest part of body in front of hind-legs $38\frac{1}{4}$″.

Female; shot April 1st, 1908.
Height at shoulder from back of foot $43\frac{1}{2}$″.
Nose to root of tail $61\frac{1}{2}$″.
Bottom of upper lip to root of horn 13″.

Presented by J. W. Brooke, Esq., 1908.

8. 10. 10. 10. Skull, with horns. Same locality.

Same history.

The following specimen, which may belong to one of the forms named by Heude (*infra*, p. 202), is not specifically determined:—

9. 8. 17. 1. Skull, with horns. Maykeng, near Fatung (Lat. 32° N., Long. 117° E.). Central China.

Presented by J. Hance, Esq., 1909.

2. Subgenus CAPRICORNULUS.

Capricornulus, *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. iv, p. 13, 1898.

Smaller serows, without heavy mane on neck, and a thicker and more woolly coat and more bushy tail.

III. CAPRICORNIS (CAPRICORNULUS) CRISPUS.

Antilope crispa, *Temminck, Fauna Japon.* p. 56, pls. xviii, xix, 1840.
Capricornis crispa, *Gray, Cat. Ungulata Brit. Mus.* p. 112, 1852, *Cat. Ruminants Brit. Mus.* p. 21, 1872.
Nemorhedus crispa, *Anderson, Zool. Yunnan Exped.* p. 336, 1878.
Nemorhædus crispus, *Blanford, Fauna Brit. India, Mamm.* p. 513, 1891; *Flower and Lydekker, Study of Mammals*, p. 350, 1891; *Lydekker, Great and Small Game of Europe, etc.* p. 175, 1901; *Thomas, Proc. Zool. Soc.* 1905, vol. ii, 357; *Ward, Records of Big Game*, ed. 6, p. 344, 1910.
Capricornulus crispus, *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. iv, p. 13, 1898.
(?) Capricornulus saxicola, *Heude, op. cit.* 1898.
Capricornis (*or* Capricornulus) crispus, *Pocock, Proc. Zool. Soc.* 1910, p. 885.

Japanese Serow.

Typical locality Nippon (Hondo), Japan.

Size approximately that of a goral. Coat typically long, harsh, and crisp; general colour varying in winter from blackish grey to rufous brown, becoming whitish on the under-parts; cheeks white; legs blackish brown.

A.—Capricornis crispus crispus.

General colour blackish grey, with the hairs, which are stiff and harsh, partly black and partly white.

1. 1. 29. 1. Skin, mounted. Japan.
Presented by E. L. Fletcher, Esq., 1901.

75. 5. 18. 1–3. Skull, with horns, and skin, female, and skull, with horns, male. Japan. *Purchased*, 1875.

5. 5. 30. 31. Skull, with horns. Washikaguchi, Nara Ken, Japan. *Presented by the Duke of Bedford, K.G.*, 1905.

4. 7. 31. 1. Skin, imperfect. Korea (?).
Presented by Ford G. Barclay, Esq., 1904.

B.—Capricornis crispus pryerianus.

Capricornis pryerianus, *Heude*, *Mém. Hist. Nat. Emp. Chinois*, vol. ii, p. 230, 1894.

Capricornulus pryerianus, *Heude*, *op. cit.* vol. iv, p. 13, 1898.

Nemorhædus crispus pryeri, *Lydekker*, *Great and Small Game of Europe, etc.* p. 175, 1901.

Typical locality Nippon.

Founded on a skull obtained in Tokyo, with which the describer identified a skin seen in the same city, which was stated to be rufous brown, and may have been the one entered below. In the latter the coat is thicker, softer, and more woolly than in typical *crispus*, and its colour pale rufous brown mingled with whitish, especially on face and neck.

80. 3. 20. 1. Skin, mounted. Purchased in Tokyo by H. Pryer, Esq. Type (?). *Purchased*, 1880.

IV. CAPRICORNIS (CAPRICORNULUS) SWINHOEI.

Capricornis swinhoii, *Gray*, *Ann. Mag. Nat. Hist.* ser. 3, vol. x, p. 320, 1862, *Proc. Zool. Soc.* 1862, p. 263, pl. xxxv; *Swinhoe*, *Proc. Zool. Soc.* 1870, p. 647.

Capricornis swinhoei, *Gray*, *Cat. Ruminants Brit. Mus.* p. 21, 1872, *Hand-List Ruminants Brit. Mus.* p. 92, 1873.

Nemorhedus swinhoei, *Anderson*, *Zool. Yunnan Exped.* p. 336, 1878.

Nemorhædus swinhoei, *Blanford*, *Fauna Brit. India*, *Mamm.* p. 513, 1891.

Formosan Serow.

Typical (and only) locality Formosa.

Closely allied to *crispus*, but general colour blackish brown, with a narrow nuchal stripe, and the knees and front of fore-legs below them black; hind-legs bay; sides of chin pale yellowish, and a yellowish brown throat-patch, separated from yellow of chin by a ridge of long hairs; ears brown externally, paler internally.

62. 12. 24. 1. Skull, with horns, and skin. Formosa; collected by R. Swinhoe, Esq. Type. *Purchased*, 1862.

70. 2. 10. 35. Skin, immature. Same locality and collector. *Purchased*, 1870.

70. 2. 10. 34. Skin, immature female, mounted. Same locality and collector. The colour of the skin is bright foxy,

but whether this is due to the effects of light, or is a character of the young animal, is not apparent. *Same history.*

70. 2. 10. 33. Skull, with horns, immature. Same locality and collector. *Same history.*

The following names have been applied by Heude, *Mém. Hist. Nat. Emp. Chinois*, to members of this group from Indo-China, etc. :—

(1) *Capricornis maritimus*, vol. ii, p. 4, note, 1888, *ibid.* p. 226, 1894. Tonkin.

(2) *Capricornis rocherianus*, vol. ii, p. 225, 1894. Along.

(3) *Capricornis venetianus*, ibid. p. 227, 1894. Along.

(4) *Capricornis maxillaris*, ibid. p. 229, 1894. Chao-Hing.

(5) *Capricornis cornutus*, (6) *erythropygius*, (7) *microdonticus*, (8) *ungulosus*, (9) *fargesianus*, (10) *brachyrhinus*, (11) *nasutus*, (12) *pugnax*, (13) *longicornis*, (14) *chrysochœtes*, vol. ii, pp. 232, 233, 1894. Sze-chuan and other parts of China.

(15) *Capricornis marcolinus*, vol. iii, p. 151, 1896. Tonkin.

(16) *Capricornis vidianus*, ibid. p. 154, 1896. Anam.

The names *C. platyrhinus* and *C. berthelianus* are also quoted by Pocock. Of the above, *maritimus* is the type of *Lithotragus*, see Pocock, *Ann. Mag. Nat. Hist.* ser. 8, vol. i, p. 188, 1908.

III.—Genus NEMORHÆDUS.

Næmorhedus, *H. Smith, Griffith's Anim. Kingdom*, vol. v, p. 352, 1827, in part; *Pocock, Ann. Mag. Nat. Hist.* ser. 8, vol. i, p. 187, 1908, *Proc. Zool. Soc.* 1910, p. 853.

Næmorhædus, *Jardine, Nat. Libr.* vol. iv, p. 277, 1836.

Kemas, *Ogilby, Proc. Zool. Soc.* 1836, p. 138, nec *Cemas*, Oken.

Nemorhedus, *Gray, List Mamm. Brit. Mus.* pp. xxvi and 160, 1843, *Cat. Ungulata Brit. Mus.* p. 112, 1852, *Cat. Ruminants Brit. Mus.* p. 41, 1872.

Urotragus, *Gray, Ann. Mag. Nat. Hist.* ser. 4, vol. viii, p. 372, 1871, *Cat. Ruminants Brit. Mus.* p. 21, 1872; *Lydekker, Great and Small Game of India, etc.* p. 136, 1900, *Game Animals of India, etc.* p. 148, 1907.

Nemorhædus, *Flower and Garson. Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 254, 1884, in part; *Lydekker, Cat. Hume Bequest Brit. Mus.* p. 26, 1913.

Cemas, *Blanford, Fauna Brit. India, Mamm.* p. 516, 1891.

Size much the same as in smaller species of *Capricornis*, from which the present genus differs by the absence of face-glands, and of lachrymal pits for their reception, as well as by the obtuse angle formed in the profile at the junction of

the parietal and facial regions of the skull. Orbits, at least typically, rather more prominent. Tail short or relatively long.

The range of the genus extends from the Himalaya to north-western and central China.

The following "key" to the five species here recognised as valid is based on one given by Pocock:—

A. Tail short, about 3 inches (exclusive of hair); black stripe on fore-legs extending over knees, and usually to fetlocks.

a. General colour grey or fawn-grey, more or less suffused with black; dorsal stripe absent, or not extending behind withers; tail black at tip; no black on back of thighs..... *N. goral.*

b. General colour brown, more or less suffused with black; a black dorsal stripe, extending at least to loins; a black stripe on upper side of tail, and another along back of each thigh..... *N. hodgsoni.*

B. Tail long, about 5 inches; black stripe on front of fore-legs stopping short of knees, but deflected at that point and generally continued down inner side of shanks to outer lateral hoofs and thence to back of fetlocks.

a. Coat relatively short and not woolly; tail moderately bushy, with upper and lower surfaces of tuft black; throat-patch more or less yellow, at least marginally..... *N. griseus.*

b. Coat long, shaggy, and more or less woolly, at least in winter; tail-tuft long and bushy; no yellow in throat-patch.

b'. Legs below knees and hocks nearly uniform fawn in front and on outer sides; tail-tuft black, much darker than base of tail and middle of back; a narrow fringe of white hairs bordering tail below..... *N. caudatus.*

b''. Legs below knees and hocks more or less fuscous in front, and thus contrasting with white or dirty white of feet; upper side of tail not wholly black and similar in colour to back; a broad white fringe bordering tail below..... *N. raddeanus.*

I. NEMORHÆDUS GORAL.

Antilope goral, *Hardwicke, Trans. Linn. Soc. Zool.* vol. xiv, p. 518, pl. xiv, 1825; *Owen, Proc. Zool. Soc.* 1836, p. 38.

(?) Antilope duvauceli, *H. Smith, Griffith's Anim. Kingdom*, vol. iv, p. 279, 1827.

Antilope (Nemorhedus) goral, *Hodgson, Proc. Zool. Soc.* 1834, p. 85, *Journ. Asiat. Soc. Bengal*, vol. iv, p. 488, 1835.
Kemas goral, *Ogilby, Proc. Zool. Soc.* 1836, p. 138; *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xvi, p. 607, 1847.
Nemorhedus goral, *Gray, List Mamm. Brit. Mus.* p. 160, 1843, *Cat. Ungulata Brit. Mus.* p. 112, 1852, *Cat. Ruminants Brit. Mus.* p. 41, 1872; *Horsfield, Cat. E. Indian Mus.* p. 168, 1851; *Adams, Proc. Zool. Soc.* 1858, p. 523; *Blyth, Cat. Mus. Asiat. Soc. Bengal*, p. 175, 1863; *Jerdon, Mamm. India*, p. 285, 1867; *Blanford, Journ. Asiat. Soc. Bengal*, vol. xli, pt. 2, p. 40, 1872; *Lydekker, ibid.* vol. xlvi, pt. 2, p. 286, 1877.
Cemas goral, *Blanford, Fauna Brit. India, Mamm.* p. 516, 1891.
Nemorhædus goral, *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 258, 1884; *Sterndale, Mamm. India*, p. 457, 1884; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 148, 1891; *Lydekker, Cat. Hume Bequest Brit. Mus.* p. 26, 1913.
Urotragus goral, *Lydekker, Great and Small Game of India*, p. 136, 1900.
Urotragus bedfordi, *Lydekker, Zoologist*, 1905, p. 83, *Game Animals of India, etc.* p. 151, 1907; *Ward, Records of Big Game*, ed. 6, p. 342, 1910.
Næmorhedus goral, *Pocock, Proc. Zool. Soc.* 1908, p. 192, 1910, p. 853.

Grey Himalayan Goral.

In employing *Nemorhædus* for the gorals instead of the serows, the writer has followed Pocock, although he considers such a change much to be deprecated, especially as in Hamilton Smith's original description the name *N. sumatrensis* stands first. As regards the spelling of the name, *Nœmorhedus* is etymologically wrong, as the word is derived from *nemus* (gen. *nemoris*), a wood, and *hædus*, a young goat, and it may be taken as a misprint, especially since Hamilton Smith himself seems to have been uncertain on this point, writing on p. 277 of vol. iv. of the "Animal Kingdom" Nœmorhædine Group, while in the fifth volume he employed *Nœmorhedus*. In the "Naturalist's Library" Jardine used *Nœmorhœdus*.

Typical locality Himalaya.

Tail short, about three inches. General colour grey or greyish fawn, more or less suffused with black; dorsal stripe absent or extending only to withers; a dark stripe on front of fore-legs extending at least over knees; tail black at tip; no black line on back of thighs; throat-patch white. Horns nearly straight. Height at shoulder from 26 to 28 inches.

97. 4. 3. 1. Skin, mounted. Himalaya, probably Dharmsala. Type of *Urotragus bedfordi*.

Presented by the Duke of Bedford, K.G., 1897.

8. 8. 22. 1–7. Seven skins. Chamba; collected by Major Rodon. *Presented by H.H. the Raja of Chamba*, 1908.

55. 1. 20. 5. Skin. Nepal. Noticed by Pocock, *P. Z. S.*, 1908, p. 194.

Presented by H.H. Maharaja Dhuleep Singh, 1855.

37. 6. 10. 74–76. Three skins, formerly mounted, of which one is immature, probably referable to this species. Himalaya. *Presented by Col. Cobbe*, 1837.

The following specimens may belong either to the present species or to *N. hodgsoni*:—

12. 10. 31. 41. Skull, with horns. Near Masuri, Garhwal. In this specimen, which stands No. 14 in Ward's list, the horns measure $7\frac{1}{2}$ inches in length by 3 in girth, with a tip-to-tip interval of $2\frac{3}{4}$ inches. The record length for goral horns is $9\frac{1}{8}$ inches.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 42. Skull and horns. Kumaon.

Same history.

91. 8. 7. 114. Frontlet and horns. Gahrwal.

Presented by A. O. Hume, Esq., C.B., 1891.

91. 8. 7. 115. Skull, with horns. Near Simla.

Same history.

91. 8. 7. 116. Skull, with horns. Gahrwal.

Same history.

91. 8. 7. 117. Skull, with horns. Sind Valley, Kashmir; collected by A. Dalgleish, Esq. *Same history.*

91. 8. 7. 118. Skull, with horns, female. Kumaon; collected by N. Troup, Esq. *Same history.*

634, *p.* Skeleton, immature. Nepal.

Presented by B. H. Hodgson, Esq.

58. 5. 4. 34. Skull, with horns. Nepal.

Same donor, 1858.

45. 1. 8. 181–83. Three skulls, with horns. Nepal.

Same donor, 1845.

79. 11. 21. 185. Skull, with horns. Nepal; collected by B. H. Hodgson, Esq. *Transferred from India Museum*, 1879.

79. 11. 21. 186. Skull, with horns. Himalaya.

Same history.

56. 5. 6. 75. Skull. Kashmir; collected by W. Theobald, Esq. *Presented by Dr. T. Oldham*, 1856.

58. 6. 9. 20. Skull, with horns. Himalaya.
Presented by the Zoological Society, 1858.

60. 4. 20. 5. Skull, with horns. Himalaya.
Purchased (*Stevens*), 1860.

634, *q*. Frontlet and horns. Himalaya. *No history.*

634, *m*. Frontlet and horns. Himalaya.
Presented by Dr. T. Oldham.

634, *a*. Frontlet and horns, female. Himalaya.
No history.

II. NEMORHÆDUS HODGSONI.

Næmorhedus hodgsoni, *Pocock*, *Proc. Zool. Soc.* 1910, p. 195.

Urotragus goral, *Lydekker*, *Zoologist*, 1905, p. 83, *Game Animals of India, etc.* p. 151, 1907; *Ward*, *Records of Big Game*, ed. 6, p. 342, 1910.

Nemorhædus hodgsoni, *Lydekker*, *Cat. Hume Bequest Brit. Mus.* p. 26, 1913.

Brown Himalayan Goral.

Typical locality Himalaya.

Distinguished from *N. goral* by the general colour being brown, more or less suffused with black, the presence of a distinct dorsal stripe extending at least to loins, and also of a black line on upper side of tail, and of another running up back of thighs.

91. 10. 7. 169. Skin. Sikhim; collected by L. Mandelli, Esq. Type. *Presented by Dr. W. T. Blanford*, 1891.

45. 1. 8. 325–27. Three skins. Nepal; referred to this species by Pocock, *P. Z. S.*, 1908, p. 195.
Presented by B. H. Hodgson, Esq., 1845.

III. NEMORHÆDUS GRISEUS.

Antilope (Næmorhedus) griseus, *Milne-Edwards*, *Arch. Mus*, *Paris*, vol. vii, *Bull.* p. 93, 1871, *Rech. Mamm.* p. 361, pl. lxxi, 1874.

(?) Antilope (Næmorhedus) cinereus, *Milne-Edwards*, *Rech. Mamm.* p. 362, pl. lxx. 1874.

(?) Næmorhedus arnouxianus, *Heude*, *Mém. Hist. Nat. Emp. Chinois*, vol. ii, p. 3, 1888, p. 239, 1894, vol. iii, pl. xxix, 1897.

Kemas henryanus, *Henry*, *Proc. Zool. Soc.* 1890, p. 93; *Heude*, *Mém. Hist. Nat. Emp. Chinois*, vol. ii, p. 244, 1894.

Nemorhædus henryanus, *Sclater*, *Proc. Zool. Soc.* 1890, p. 94.

Cemas griseus, *Blanford, Fauna Brit. India, Mamm.* p. 516, 1891.
(?) Cemas cinereus, *Blanford, loc. cit.* 1891.
(?) Kemas xanthodeiros,
(?) Kemas pinchonianus,
(?) Kemas iodinus,
} *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. ii, p. 243, 1894.*
Urotragus griseus, *Lydekker, Great and Small Game of India, etc.* p. 140, 1900, *Game Animals of India, etc.* p. 155, 1907; *Ward, Records of Big Game*, ed. 6, p. 344, 1910.
(?) Urotragus cinereus, *Lydekker, Great and Small Game of India, etc.* p. 139, 1900, *Game Animals of India, etc.* p. 156, 1907; *Ward, Records of Big Game*, ed. 6, p. 344, 1910.
Urotragus evansi, *Lydekker, Zoologist*, ser. 4, vol. ix, p. 83, 1905, *Game Animals of India, etc.* p. 153, 1907.
Næmorhedus griseus, *Pocock, Proc. Zool. Soc.* 1908, p. 201; *Allen, Bull. Mus. Harvard*, p. 202, 1912.

Sze-chuan Goral.

Typical locality Moupin, Sze-chuan, western China.

Tail relatively long (about 5 inches exclusive of hair), moderately bushy, with terminal tuft black on upper and lower surfaces; coat comparatively short, not woolly; throat-patch more or less yellow, at least on the margins; black stripe on front of fore-legs stopping short of knees, but continued down outer side of shanks to fetlocks. General colour very variable, ranging from ashy grey to yellowish brown, with a distinct dark dorsal stripe; the feet bring either white or rust-colour.

The geographical range, if all the above-mentioned forms are rightly included under one heading, extends from Sze-chuan to Yun-nan and Burma on the one side, and to the Ichang district of southern China on the other.

8. 10. 9. 15. Skin, mounted. Sze-chuan.
Presented by J. W. Brooke, Esq., 1908.

8. 10. 9. 14. Skin. Same locality. *Same history.*

8. 10. 9. 16–17. Scalp-skin and skull, with horns. Same locality. *Same history.*

8. 10. 9. 18. Young skin. Same locality. *Same history.*

6. 1. 25. 1. Head, mounted. Ichang, Central China.
Presented by A. E. Leatham, Esq., 1906.

96. 11. 4. 7–8. Two skins and skulls, with horns. Loung-nyou-fou, Sze-chuan; collected by Berezowski, referred to by Pocock, *op. cit.*, p. 199. *Purchased*, 1896.

* All these three are from Sze-chuan, but *arnouxianus* is from Chekiang; *vide* Pocock, *op. cit.*, 1898, p. 201.

95. 7. 4. 2. Skull, with horns, and skin. Ichang; collected by F. W. Styan, Esq., mentioned by Pocock, *loc. cit.*
Purchased, 1895.

1. 3. 2. 4–5. Two skulls, with horns, and skins. Same locality. *Presented by F. W. Styan, Esq.*, 1901.

88. 10. 17. 1. Skull, with horns, and skin, immature. Ichang. *Presented by P. Montgomery, Esq.*, 1888.

90. 1. 16. 1. Skeleton. Same locality. *Same donor*, 1890.

0. 6. 27. 6. Skull, with horns. Paodri, Shen-si.
Presented by Rev. Father Hugh, 1900.

8. 8. 15. 1. Skull, with horns, and skin. Ichang.
Presented by J. H. Teesdale, Esq., 1908.

8. 8. 15. 1. Head, immature. Same locality.
Same history.

11. 9. 8. 140–143. Four skulls, with horns, two (142–3) being females. Si-ho Valley, western Sze-chuan; collected by M. P. Anderson, Esq.
Presented by the Duke of Bedford, K.G., 1911.

11. 6. 1. 8. Skull, with horns, female. Shen-si; same collector. *Same history.*

5. 7. 21. 1–2. Two skins, with skulls and horns. Mt. Victoria, Pokokku district, Arakan. *Types of U. evansi.*
Presented by Lieut.-Col. G. H. Evans, 1905.

6. 7. 4. 1. Skin, immature. Byingi, Upper Burma.
Presented by Lieut.-Col. C. T. Bingham, 1906.

IV. NEMORHÆDUS CAUDATUS.

Antilope (Næmorhedus) caudatus, *Milne-Edwards, Ann. Sci. Nat.* ser. 5, vol. vii, p. 377, 1867, *Rech. Mamm.* p. 186, pl. xxiii, 1874.

Urotragus caudatus, *Gray, Ann. Mag. Nat. Hist.* ser. 4, vol. viii, p. 371, 1871, *Cat. Ruminants Brit. Mus.* p. 21, 1872, *Hand-List Ruminants Brit. Mus.* p. 92, 1873; *Lydekker, Game Animals of India, etc.* p. 155, 1907; *Ward, Records of Big Game, ed.* 6, p. 340, 1910.

Nemorhædus caudatus, *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 149, 1891.

Cemas caudata, *Blanford, Fauna Brit. India, Mamm.* p. 516, 1891.

Long-tailed Serow.

Typical locality Sze-chuan, western China.

Coat, at least in winter, long, shaggy, and more or less woolly; tail with a long and bushy terminal tuft, which is

wholly black and much darker than root and adjacent portion of back; a narrow white fringe bordering tail below; no yellow in throat-patch; legs below knees and hocks uniformly fawn-coloured in front and on outer sides; general colour much as in next species.

90. 7. 8. 6. Skin and skull, with horns, immature. Near Pekin; collected by F. W. Styan, Esq., and referred to by Pocock, *Proc. Zool. Soc.*, 1908, p. 198. *Purchased*, 1890.

67. 12. 12. 2. Skin, immature, originally mounted. Szechuan; collected by the Abbé David.

By exchange with the Paris Museum, 1867.

V. NEMORHÆDUS RADDEANUS.

Antilope (Caprina) crispa, *Radde, Reisen Öst-Siberien*, vol. i, p. 262, pl. xii, p. 1, 1862, nec *Temminck*.

Kemas raddeanus, *Heude, Mém. Hist. Nat. Emp. Chinois*, vol. ii, p. 240, 1894.

Næmorhædus raddeanus, *Pocock, Proc. Zool. Soc.* 1908, p. 196, 1910, p. 854.

Amur Goral.

Typical locality Amurland.

Distinguished from *N. caudatus* by front of legs below knees and hocks being more or less fuscous, and contrasting strongly with the white or dirty white feet; and by whole upper side of tail not being black but agreeing in colour with adjacent portion of back; as well as by a broad white fringe bordering tail below. General colour in winter greyish yellow brown, darker along spine; front of head blackish from muzzle to occiput; sides of head and margins of lips (which are elsewhere white) greyish yellow mingled with black; chin black; a large white throat-patch. For other details see Pocock, *Proc. Zool. Soc.*, 1908, p. 196.

The distributional area includes Korea.

99. 3. 5. 1–3. Three skins, male, female, and young. Western China; referred to by Pocock, *Proc. Zool. Soc.*, 1908, p. 198. *Presented by J. Rowland Ward, Esq.*, 1899.

91. 6. 29. 7. Skeleton, provisionally referred to this species. Kentei Mountains, northern Mongolia; collected by Messrs. Dörries. *Purchased*, 1891.

10. 9. 25. 1. Skin and skull. Korea. Noticed by Pocock, *loc. cit.* *Presented by the Zoological Society*, 1910.

The following names, in addition to those already cited, have been proposed by Heude, *Mém. Hist. Nat. Emp. Chinois*, for members of this group:—

Urotragus galeanus, vol. ii, p. 175, 1894; *Sowerby, in Clark and Sowerby's* "Through Shên-Kan," p. 175, 1912.

Kemas niger, vol. ii, p. 241, 1894. } Probably identical; *vide* Pocock,
Kemas fargesianus, *loc. cit.* } *Proc. Zool. Soc.* p. 201, note.

IV. Genus BUDORCAS.

Budorcas, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xix, p. 65, 1850; *Gray, Cat. Ruminants Brit. Mus.* p. 32, 1872; *Rütimeyer, Abh. schweiz. pal. Ges.* vol. iv, p. 102, 1877; *Pocock, Proc. Zool. Soc.* 1910, p. 856, *Journ. Bombay Nat. Hist. Soc.* vol. xix, p. 812, 1910.

Build heavy and size large; limbs stout, especially the front shanks, with the cannon-bones short and broad; muffle small, the summit of the muzzle above nostrils being hairy; a beard; no face-glands, foot-glands, or glands behind the horns; interdigital cleft shallow; four teats; tail short; horns massive, directed outwardly at base, then slightly downwards, and finally upwards; with a hind keel at base, which curves obliquely across front of horizontal portion. In young animals the horns form simple upright spikes, representing the smooth tips of those of adults.

The structure of the skull approximates very closely to that of *Nemorhœdus*, such differences as exist, like the slighter curve of the fronto-parietal region, being due to the more massive horns.

The distribution extends from Bhutan and the Mishmi Hills of the Eastern Himalaya through Yun-nan to Sze-chuan, Kan-su, and Shen-si.

The three species (or perhaps races) may be distinguished as follows:—

A. Dark dorsal stripe.
  a. Dorsal stripe extending from occiput to tail; ears and entire head in front of them black ..... *B. taxicolor.*
  b. Dorsal stripe not extending in advance of withers; black on head confined to back of ears, a ring round each eye, front of face in advance of the same, and tip of chin ..... *B. tibetanus.*
B. No dark dorsal stripe.
  Whole face orange-yellow ..... *B. bedfordi.*

I. BUDORCAS TAXICOLOR.

Budorcas taxicolor, *Hodgson, Journ. Asiat. Soc. Bengal*, vol. xix, p. 65, pl. i, 1850; *Sterndale, Mamm. India*, p. 460, 1884; *Hume, Proc. Zool. Soc.* 1887, p. 483; *W. L. Sclater, Cat. Mamm. Ind. Mus.* pt. ii, p. 151, 1891; *Blanford, Fauna Brit. India, Mamm.* p. 515, 1891; *Lydekker, Game Animals of India, etc.* p. 158, 1907, *Proc. Zool. Soc.* 1908, p. 795, *Field*, vol. cxxi, p. 93, 1913, *Cat. Hume Bequest Brit. Mus.* p. 22, 1913; *Mitchell, Proc. Zool. Soc.* 1907, p. 464, 1909, p. 741; *Bentham, Rec. Indian Mus.* vol. ii, p. 249, 1908; *Ward, Records of Big Game*, ed. 6, p. 349, 1910; *Pocock, Journ. Bombay Nat. Hist. Soc.* 1910, p. 814, *Proc. Zool. Soc.* 1910, p. 856.

Budorcas taxicola, *Gray, Cat. Ungulata Brit. Mus.* p. 45, 1852, *Cat. Ruminants Brit. Mus.* p. 32, 1872, *Hand-List Ruminants Brit. Mus.* p. 101, 1873; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 231, 1863.

TAKIN.

Typical locality Mishmi Hills, north of Assan Valley.

General colour of upper-parts varying from pale straw-colour or yellowish dun grey through rufous to black; the dun grey sometimes occupying the greater part of the back, exclusive of the black dorsal stripe, which extends from occiput to tail, but in other cases forming a larger or smaller light saddle; whole of head and neck, most of the under-parts, tail, and limbs black. Horns, of which the maximum recorded length is 25 inches, with a girth of 13, and a tip-to-tip interval of 11½ inches, relatively thick.

A.—Budorcas taxicolor taxicolor.

General characters those of species; size large—shoulder-height about 3½ feet. The herds appear to vary in colour, which may be reddish in one district, and dun in another a few miles distant.*

Typical locality Mishmi Hills.

79. 11. 21. 662. Skin, mounted. Mishmi Hills; collected by B. H. Hodgson, Esq. This and the next two specimens are the co-types. *Transferred from India Museum*, 1879.

53. 8. 16. 9. Skin, mounted, female. Mishmi Hills. General colour of light areas yellow dun or straw-colour.

Presented by B. H. Hodgson, Esq., 1853.

* See *Field*, vol. cxxi, p. 93, 1913.

79. 11. 21. 11. Skull, imperfect, with horns. Mishmi Hills; collected by B. H. Hodgson, Esq.

Transferred from India Museum, 1879.

79. 8. 19. 1. Skin, female, mounted. Mishmi Hills.

Presented by Lieut.-Col. Graham, 1879.

81. 6. 20. 1. Skin, mounted. Mishmi Hills; collected by C. F. Rowe, Esq. General colour much the same as in No. 53. 8. 16. 9. *Purchased*, 1881.

81. 6. 20. 2. Skin. Same locality and collector. In this specimen, which appears to be in winter dress, the light dorsal area is much smaller than in the preceding example.

Purchased, 1881.

85. 8. 1. 367. Skin, and limb-bones. Mishmi Hills. Apparently in summer coat; general colour bright rufous, more intense than in No. 12. 12. 5. 1, with scarcely any black on hind-quarters and limbs.

Presented by A. O. Hume, Esq., C.B., 1885.

12. 12. 5. 1. Portion of body-skin, tanned and cut for a "poncho" by Mishmis, Ichigo, ten miles up the Dibang River in the Chulikalta portion of the Mishmi Hills. General colour on the back and fore-quarters bright rufous tawny, with a black dorsal streak, passing into blackish on the flanks, owing to the terminal half of the hairs in this region being black. The colour-pattern is much the same as in the skins collected by Rowe. *Presented by Capt. Leonard Bethell*, 1912.

67. 5. 20. 1–2. Two frontlets, with horns. Mishmi Hills. *Purchased*, 1867.

65. 5. 28. 1. Frontlet and horns. Mishmi Hills.

Purchased (*Stevens*), 1865.

65. 6. 71. 1. Imperfect skin, and horns. Mishmi Hills.

Purchased, 1865.

91. 8. 7. 119–20. Two pairs of horns. Mishmi Hills.

Presented by A. O. Hume, Esq., C.B., 1891.

12. 10. 31. 43. Imperfect skull, with horns. Mishmi Hills; collected by J. Needham, Esq. This specimen, which is probably the one represented in fig. 1 of the plate accompanying Hume's paper, stands No. 11 in Ward's list. The horns measure $20\frac{3}{4}$ inches in length and $11\frac{7}{8}$ in girth, with a tip-to-tip interval of $12\frac{1}{2}$ inches.

Bequeathed by A. O. Hume, Esq., C.B., 1912.

12. 10. 31. 44. Immature frontlet and horns. Mishmi Hills; collected by Mr. Needham. This specimen was regarded as a female by Hume, who, in the paper cited above, expressed the opinion that the horns of female takin differ essentially in form from those of males. *Same history.*

5. 11. 13. 1. Skull, with horns. Mishmi Hills.
Presented by N. Williamson, Esq., 1905.

B.—Budorcas taxicolor whitei.

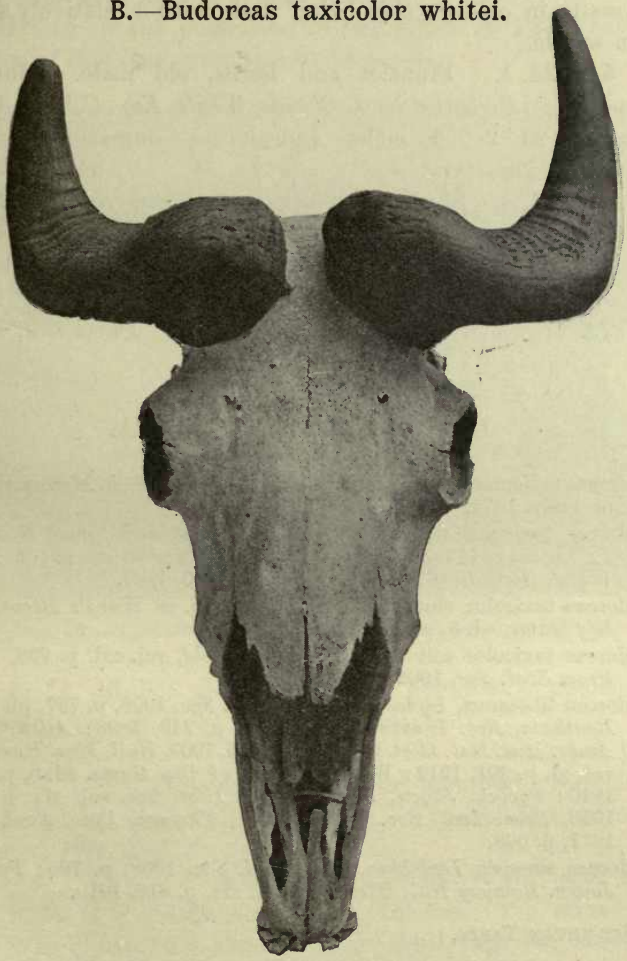

FIG. 52.—SKULL AND HORNS OF BHUTAN TAKIN (*Budorcas taxicolor whitei*).
Proc. Zool. Soc. 1908.

Budorcas taxicolor whitei, *Lydekker*, *Field*, vol. cx, p. 887, 1907, *Proc. Zool. Soc.* 1907, p. 749, *ibid.* 1908, p. 798; *White*, *Proc. Zool. Soc.* 1909, p. 668; *Pocock*, *Journ. Bombay Nat. Hist. Soc.* vol. xix, p. 817, 1910, *Proc. Zool. Soc.* 1910, p. 856.

Typical locality Bhutan.

Named in the belief that the Bhutan takin is smaller than the typical Mishmi animal. Such specimens as have come under the writer's notice do not present any marked diversity in colour; this being dark, with a relatively small dun saddle.

6. 8. 24. 1. Frontlet and horns, old male. Bhutan. Type. *Presented by J. Claude White, Esq., C.M.G.*, 1906.

6. 8. 24. 2. Frontlet and horns, immature female. Bhutan. Para-type. *Same history.*

6. 8. 24. 3. Skull, with upper part cut away. Upper Chumbi Valley. *Same history.*

8. 3. 23. 1. Skull, with horns (fig. 52). Bhutan; collected by J. Claude White, Esq. Figured *Proc. Zool. Soc.* 1908, p. 799. *Purchased*, 1908.

II. BUDORCAS TIBETANA.

Budorcas taxicolor *var.* tibetana, *Milne-Edwards*, *Rech. Mamm.* p. 367, pl. lxxiv, 1874.

Budorcas taxicolor tibetanus, *Lydekker*, *Great and Small Game of India, etc.* p. 144, 1900, *Game Animals of India, etc.* p. 163, 1907; *Ward*, *Records of Big Game*, ed. 5, p. 350, 1907.

Budorcas taxicolor sinensis, *Berezowski*, *M.S. in Ward's Records of Big Game*, ed. 5, p. 350, 1907.

Budorcas taxicolor mitchelli, *Lydekker*, *Field*, vol. cxi, p. 798, 1908, *Proc. Zool. Soc.* 1908, p. 795.

Budorcas tibetanus, *Lydekker*, *Proc. Zool. Soc.* 1908, p. 797, pl. xliii; *Bentham*, *Rec. Indian Mus.* vol. ii, p. 249, 1898; *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xxvi, p. 425, 1909, *Bull. Mus. Harvard*, vol. xl, p. 201, 1912; *Ward*, *Records of Big Game*, ed. 6, p. 350, 1910; *Pocock*, *Journ. Bombay Nat. Hist. Soc.* vol. xix, p. 818, 1910, *Proc. Zool. Soc.* 1910, p. 856; *Thomas*, *Proc. Zool. Soc.* 1911, p. 693.

Budorcas sinensis, *Lydekker*, *Proc. Zool. Soc.* 1908, p. 795; *Pocock*, *Journ. Bombay Nat. Hist. Soc.* vol. xix, p. 819, 1910.

Sze-chuan Takin.

Typical locality Moupin, Sze-chuan, western China.

General colour of upper-parts in male rich golden yellow

in summer and grey in winter, but clouded in places at former season with iron-grey, and passing into iron-grey or blackish on limbs and hind-quarters; in female yellow replaced by grey; a dorsal stripe from withers to tail blackish, as are also the tail, ears, a ring round each eye, front of lower part of face and tip of chin. Horns, in some cases at least, thinner, more arched, and more distinctly ridged at base than in typical species.

Horns in the possession of the writer indicate that the range of this race extends into Yun-nan.

FIG. 53.—SZE-CHUAN TAKIN (*Budorcas tibetana*), subadult male.

5. 11. 30. 5. Skin, subadult, mounted. Sze-chuan; figured *Proc. Zool. Soc.*, 1908, pl. xliii., fig. 1.

Purchased, 1905.

8. 6. 13. 3. Skin, subadult female, mounted. Sze-chuan; collected by Mason Mitchell, Esq. Type of *B. t. mitchelli*, figured *Proc. Zool. Soc., op. cit.*, fig. 2.

Presented by J. Rowland Ward, Esq., 1908.

8. 10. 9. 7. Skin, horns, and skeleton. Ten miles west of Wen-chuan, Sze-chuan. The skull (fig. 54) described and figured *Proc. Zool. Soc.*, 1908, p. 798.

Presented by J. W. Brooke, Esq., 1908.

8. 10. 9. 8. Skin, horns, and skeleton (mounted), female. Same locality. *Same history.*

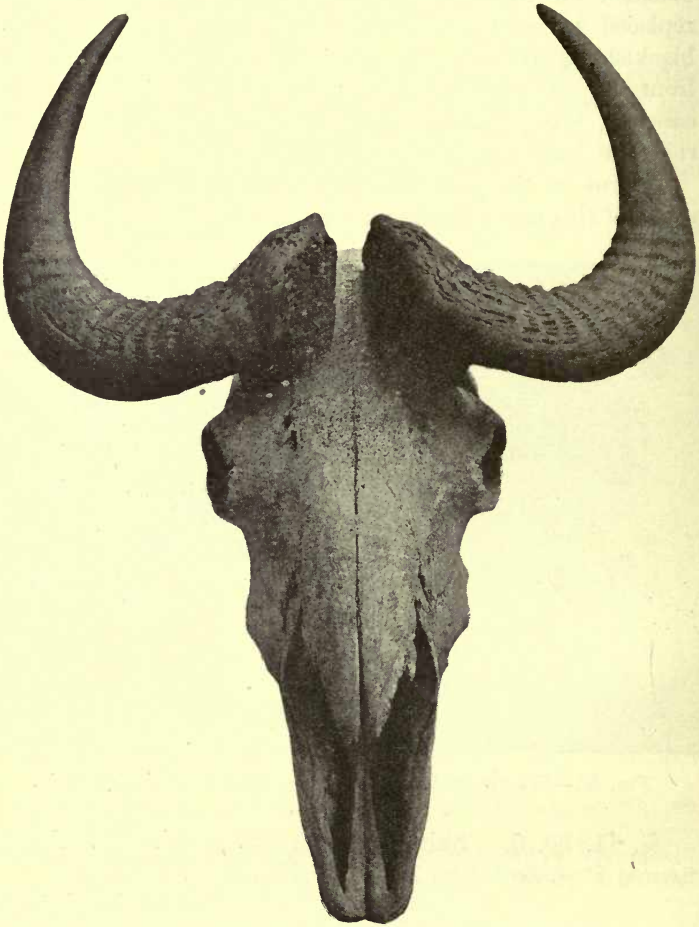

FIG. 54.—SKULL AND HORNS OF SZE-CHUAN TAKIN (*Budorcas tibetana*). This skull belongs to a younger animal than the one in fig. 52, as indicated by the greater length of the smooth tips of the horns, which become worn down with age.

Proc. Zool. Soc. 1908.

96. 11. 4. 5. Young skin and skull. Sze-chuan; collected by Berezowski. *Purchased*, 1896.

8. 10. 9. 9. Skin, horns, and skeleton, young. Same locality. *Same history.*

9. 7. 21. 10. Skull, with horns, immature. Upper Min Valley, Sze-chuan; collected by J. W. Brooke, Esq.
Presented by Mrs. Brooke, 1909.

III. BUDORCAS BEDFORDI.

Budorcas bedfordi, *Thomas*, *Abstr. P.Z.S.* 1911, p. 27, *Proc. Zool. Soc.* 1911, p. 633, pl. xxix.

Shen-si Takin.

Typical locality Tai-pei-san, Shen-si, China.

General colour golden buff, tending to ochery in males and to creamy in females, with face similar in colour to back, dorsal line not darkened, and limbs showing only a few dark hairs on knees and hocks; tail bushy, with in some instances isolated dark hairs.

Specimens collected by Messrs. Fenwick Owen and Wallace indicates that the range includes eastern Kan-su, where the colour of the coat tends to brownish orange.

11. 6. 1. 64. Skull, with horns, and skin, female. Tai-pei-san, southern Shen-si, at an elevation of 10,000 feet. Type. Collected by M. P. Anderson, Esq.; killed January, 1910. *Presented by the Duke of Bedford, K.G.*, 1911.

11. 6. 1. 63. Skin, mounted, and skull. Same locality collector, and date. *Same history*

11. 6. 1. 68. Skull, same locality, collector, and date. *Same donor.*

V. Genus OREAMNOS.

Oreamnos, *Rafinesque*, *Amer. Month. Mag.* vol. ii, p. 44, 1817; *Pocock*, *Proc. Zool. Soc.* 1910, p. 851.

Aplocerus, *H. Smith*, *Griffith's Anim. Kingdom*, vol. v, p. 354, 1827.

Haplocerus, *Wagner*, *Schreber's Säugtiere*, *Suppl.* vol. iv, p. 462, 1842.

Mazama, *Gray*, *Cat. Ungulata Brit. Mus.* p. 114, 1852, *Cat. Ruminants Brit. Mus.* p. 41, 1872, nec *Rafinesque.*

Haploceros, *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 257, 1884.

Oreamnus, *Elliot*, *Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 44, 1901.

Build heavy, with the withers elevated into a hump, and size medium; limbs stout, with short and broad cannon-

bones; muffle small; a beard; face-glands and lachrymal depression wanting; interdigital cleft deep, as in *Capra*, and foot-glands rudimentary or absent; a large pair of bare black glands behind horns; four (?) teats. Horns medium, simply conical, ridged at base, and inclining slightly backward, with more or less lateral divergence.

The distributional area extends from the crests of the Rocky Mountains and the ranges between them and the Pacific northwards along the Pacific coast nearly to Cook's Inlet, Alaska.

OREAMNOS AMERICANUS.

Ovis montanus, *Ord*, *Guthrie's Geogr.* 2d Amer. ed. vol. ii, p. 292, 1815, nec *Schreber*.

Antilope (Rupicapra) americana, *Blainville*, *Bull. Soc. Philom.* 1816, p. 80.

Mazama dorsata, *Rafinesque*, *Amer. Month. Mag.* vol. ii, p. 44, 1817.

Mazama sericea, *Rafinesque*, *Amer. Month. Mag.* vol. ii, p. 44, 1817.

Antilope lanigera, *H. Smith*, *Trans. Linn. Soc.* vol. xiii, p. 38, 1822.

Capra columbiana, *Desmoulins*, *Dict. Class. Hist. Nat.* vol. iii, p. 580, 1823.

Antilope (Aplocerus) lanigera, *H. Smith*, *Griffith's Anim. Kingdom*, vol. v, p. 354, 1827.

Antilope (Haplocerus) lanigera, *Wagner*, *Schreber's Säugthiere*, *Suppl.* vol. iv, p. 462, 1842.

Rupicapra americana, *Richardson*, *Voy. H.M.S. Herald*, vol. ii, p. 131, 1852.

Mazama americana, *Gray*, *Cat. Ungulata Brit. Mus.* p. 114, 1852, *Cat. Raminants Brit. Mus.* p. 41, 1872, *Hand-List Ruminants Brit. Mus.* p. 111, 1873; *Gerrard*, *Cat. Bones Brit. Mus.* p. 241, 1862.

Capella rupicapra, *Baird*, *Mamm. N. Amer.* p. 671, 1857, nec *Blasius*.

Haploceros montanus, *Flower and Garson*, *Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 257, 1884; *Flower and Lydekker*, *Study of Mammals*, p. 351, 1891; *W. L. Sclater*, *Cat. Mamm. Ind. Mus.* pt. ii, p. 151, 1891; *Hornaday*, *Zool. Beob.* vol. ii, p. 20, 1909.

Mazama montana, *Merriam*, *N. Amer. Fauna*, No. 5, p. 81, 1891.

Aplocerus montanus, *Brehm*, *Tierleben*, ed. 3, *Säugetiere*, vol. iii, p. 331, 1891.

Oreamnos montanus, *Osgood*, *N. Amer. Fauna*, No. 19, p. 25, 1900; *Miller and Rehn*, *Proc. Boston Soc. Nat. Hist.* vol. xxx, p. 23, 1901; *Stone and Cram*, *Amer. Animals*, p. 57, 1903; *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xx, p. 19, 1904; *Grant*, *Rep. N. York Zool. Soc.* vol. ix, p. 230, 1905; *Pocock*, *Proc. Zool. Soc.* 1910, p. 851.

Oreamnus montanus, *Elliot*, *Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 44, 1901, *Check-List Mamm. N. Amer.*

(*Zool. Publ. Field Mus.* vol. vi) p. 52, 1905; *Lydekker, Great and Small Game of Europe, etc.* p. 329, 1901; *Ward, Records of Big Game*, ed. 6, p. 351, 1910.

Oreamnos americanus, *Hollister, Proc. Biol. Soc. Washington*, vol. xxv, p. 186, 1912.

White Goat.

Typical locality Cascade Mountains, near Brant Island, Columbia Valley, Oregon.

General characters those of the genus. Shoulder-height from about 37 to 43 inches; coat in winter long and pendent, with a dense woolly under-fur, in summer short; colour wholly yellowish white, with muzzle, horns, and hoofs black. The maximum recorded horn-length in Rocky Mountain race is 11½ inches; the girth being 4¾, and the tip-to-tip interval 6¼ inches.

The races may be distinguished as follows:—

A. Fronto-parietal region of skull flattened or slightly convex; horns stout, curving backwards with but little divergence.
  a. Size medium, skull broad ..... *O. americanus americanus.*
  b. Size large, skull narrow ..... *O. americanus columbiæ.*
  c. Size small, skull narrow ..... *O. americanus missoulæ.*

B. Fronto-parietal region of skull concave; horns slender, long, and greatly divergent, with more numerous ridges than in A..... *O. americanus kennedyi.*

A.—Oreamnos americanus americanus.

Oreamnos montanus montanus, *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xx, p. 19, 1904; *Miller, List N. Amer. Mamm. U.S. Mus.* p. 398, 1912.

Oreamnos americanus americanus, *Hollister, Proc. Biol. Soc. Washington*, vol. xxv, p. 186, 1912.

Typical locality Cascade Mountains, as above.

Size medium, skull broad, horns stout, slightly divergent, height at shoulder 39¼ inches; basal length of skull 10½ inches (270 mm.); interorbital width 2$\frac{5}{16}$ inches (95 mm.); length of palate 6$\frac{15}{16}$ inches (176 mm.); length of upper series of cheek-teeth 2⅞ inches (73 mm.).

The distributional area includes high elevations in the Rocky Mountains and other ranges between them and the Pacific to southern British Columbia.

* * * *. Skin, mounted. Rocky Mountains; collected by Sir J. Richardson. *Presented by the Zoological Society.*

87. 3. 24. 1. Skin, mounted. Rocky Mountains of north-west Montana. *Presented by J. Bate, Esq.*, 1887.

4. 16. 15. 1. Head, female, mounted. British Columbia. *Presented by W. H. Bell, Esq.*, 1904.

63. 2. 24. 43. Skin. Summit Camp, Rocky Mountains. *Presented by J. K. Lord, Esq.*, 1863.

52. 11. 30. 4. Skin. Fort Pilby. *Presented by Dr. J. Rae*, 1852.

89. 11. 7. 1. Skeleton, with horns, mounted. Rocky Mountains. *Presented by Col. J. Biddulph*, 1889.

89. 3. 10. 1. Skeleton, female. Rocky Mountains, Montana. *Presented by Sir E. G. Loder, Bart.*, 1889.

57. 7. 29. 2. Pair of horns. Locality unknown. *Presented by the Linnean Society*, 1857.

B.—Oreamnos americanus columbiæ.

Oreamnos montanus columbianus, *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xx, p. 20, 1904, *nec* Capra columbiana, *Desmoulins*, 1824.

Oreamnus montanus columbianus, *Elliot*, *Check-List Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. vi) p. 52, 1905.

Oreamnos montanus columbiæ, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxv, p. 186, 1912.

Typical locality Shesley Mountains, northern British Columbia.

Characterised by large size, and narrow skull. Height at shoulder 43 inches; basal length of skull $11\frac{1}{8}$ inches (293 mm.); interorbital width $3\frac{7}{8}$ inches (98 mm.); length of palate $7\frac{5}{16}$ inches (184 mm.); length of upper series of cheek-teeth $2\frac{7}{8}$ inches (77 mm.).

No specimen in collection.

C.—Oreamnos americanus missoulæ.

Oreamnos montanus missoulæ, *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xxv, p. 20, 1904.

Oreamnus montanus missoulæ, *Elliot*, *Check-List Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. vi) p. 53, 1905.

Oreamnos americanus missoulæ, *Hollister*, *Proc. Biol. Soc. Washington*, vol. xxv, p. 186, 1912.

Typical locality Missoula, Montana.

Characterised by the small bodily size and narrow skull.

Height at shoulder not recorded in description of type; occipito-nasal length of skull 11$\frac{3}{16}$ inches (299 mm.), as contrasted with 13$\frac{3}{8}$ inches (336 mm.). in *columbiæ;* length of upper series of cheek-teeth 2$\frac{3}{4}$ inches (69 mm.); other measurements given in preceding races not available in type.

No specimen in collection.

D.—Oreamnos americanus kennedyi.

Oreamnus kennedyi, *Elliot* (*Zool. Publ. Field Mus.* vol. iii, p. 1, 1900, *Synopsis Mamm. N. Amer.* (*op. cit.* vol. ii) p. 44, 1901, *Check-List Mamm. N. Amer.* (*op. cit.* vol. vi) p. 53, 1905; *Miller, List Mamm. N. Amer. U.S. Mus.* p. 397, 1912.

Oreamnus montanus kennedyi, *Lydekker, Great and Small Game of Europe, etc.* p. 333, 1901.

Oreamnos kennedeyi, *Hollister, Proc. Biol. Soc. Washington,* vol. xxv, p. 186, 1912.

Typical locality mountains at mouth of Copper River, opposite Kyak Island, Alaska.

Differs from three preceding races by concavity of fronto-parietal region; the concavity of inner surface of horn-cores; and the length, slenderness, and great divergence of the horns, so that while their length is nearly equal to that of the longest known pair of all the preceding races, the tip-to-tip interval is nearly double.

The range is stated to extend along Pacific coast of Alaska from the Copper River nearly to Cook's Inlet.

No specimen in collection.

Subfamily iv.—OVIBOVINÆ.

Although the musk-ox, as was suggested by Gray in 1872, may be nearly related to *Budorcas,* it is considered by Lönnberg that it should be referred to a subfamily apart from the *Rupicaprinæ,* and with this opinion Pocock provisionally concurs.

The subfamily may be provisionally characterised by the caprine type of cheek-dentition, the peculiar form and structure of the horns, which are relatively large in females, the rudimentary tail, the unsymmetrical main hoofs, the retention of lateral hoofs, and the general presence of four teats.

Genus OVIBOS.

Ovibos, *Blainville, Bull. Soc. Philom.* 1816, p. 76; *Gray, Cat. Ruminants Brit. Mus.* p. 31, 1872; *Rutimeyer, Abh. schweiz. pal. Ges.* vol. iv, p. 103, 1877; *Lönnberg, Proc. Zool. Soc.* 1900, pp. 142, 686; *Pocock, ibid.* 1910, p. 857; *Kowarzik, Zool. Anz.* vol. xxxvi, p. 107, 1911.

Præovibos, *Staudinger, Zentralbl. f. Min.* 1908, p. 481, *bis.*

Bosovis, *Kowarzik, Zool. Anz.* vol. xxxvi, p. 107, 1911.

Size relatively large, build heavy, and limbs stout, with broad and short cannon-bones, and wide main hoofs, of which one in each foot is unsymmetrical to the other. No foot-

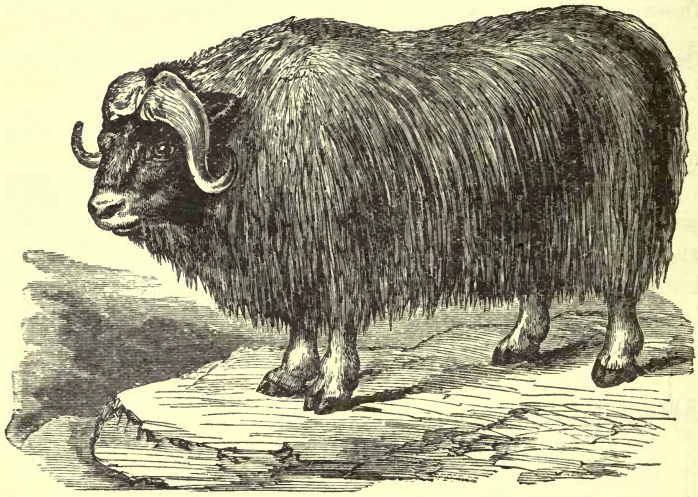

FIG. 55.—THE MUSK-OX (*Ovibos moschatus*).

glands; face-glands and lachrymal pits for their reception apparently either absent or present; muzzle hairy, with the exception of a small bare triangular muffle between the nostrils; usually four teats, but occasionally (*teste* Kowarzik) only two; tail rudimentary; main hoofs short, wide, and unsymmetrical, with the intervening cleft hairy, and lateral hoofs large. Horns coarsely fibrous in structure, closely approximated in adult males on the forehead, where their bases, which terminate in nearly straight lines, extend from above the orbits nearly to the occiput; their direction being at first outwards and downwards, and then upwards at the smooth

and cylindrical tips. Coat long, shaggy, and nearly uniform in colour. Orbits of skull tubular, nasals wide and short.

Kowarzik divides musk-oxen into two groups, a western (typified by *mackenzianus*, and including the Bering Strait, Asiatic, and European Pleistocene forms), characterised by the presence of a lachrymal pit and the reduction of the number of teats to a single pair; and an eastern, in which there is no lachrymal depression but two pairs of teats. No account is taken apparently in this classification of face-glands, which are generally stated to be absent, but are recorded by Lönnberg in a head which came from the area inhabited by the members of Kowarzik's eastern group.

These two groups are regarded by their describer as of generic value; for the eastern of which, as typified by the Canadian *O. moschatus* of Blainville, he has proposed the name *Bosovis*, while he has employed *Ovibos* for the western group. This, of course, is quite illegitimate; and if such subdivision were adopted *Ovibos* must be retained for the typical *moschatus*, while *Prœovibos*, originally proposed for a Pleistocene form, would be available for the western group. Their apparently frequent absence seems, however, to indicate that the face-glands are on the point of vanishing in these ruminants; and if this be so, there is no reason why the same thing may not hold good with regard to the lachrymal pits. On this view the presence or absence of these pits is of little or no classificatory value, and under no circumstance would justify the splitting of the original genus into two, even if these pits were constantly absent in the eastern and present in the western forms. But, as a matter of fact, the alleged distinction does not seem to hold good, as some of the undermentioned skulls from the eastern area appear to show distinct lachrymal pits.*

At the present day the distributional area of the genus

* It is not easy to realise what Kowarzik means by a lachrymal pit, as he excludes (*Fauna Arctica*, p. 106) what is regarded as such by Lönnberg, and terms it a depression caused by the angulation of the lachrymal. Moreover, after stating in two places (*op. cit.* pp. 107, 120) that the eastern members of the group have no lachrymal pit, he refers in a third (*ibid.* p. 116) to the lachrymal pit being deeper in the western than in the eastern group (*Lacrimale mit tiefer Tränengrube*). Rütimeyer states that the depression generally existing in the lachrymal is undoubtedly a true *fossa lachrymalis*.

includes Arctic America east of the Mackenzie River and north of the 60th parallel as high as Melville Island and Ellesmere Land, as well as Greenland. Hornaday (*Bull. New York Zool. Soc. op. cit.*) has, however, published evidence to show that quite recently musk-oxen were to be found in Alaska. This evidence is based on a statement made by Mr. C. D. Brewer, a fur-trader who resided near Point Barrow, Alaska, for six-and-twenty years. On arrival there in 1884 he became acquainted with an aged Eskimo who had in earlier days killed musk-oxen himself, and he subsequently came across a second native who, as a boy, had accompanied his father and family on musk-ox hunting expeditions. One such expedition was made to a small river known as the Oo-ming-mue, an Innuit name meaning musk-ox. Mr. Brewer further stated that he himself had on several occasions found musk-ox skulls lying on the open tundra in Northern Alaska, one of which retained the horns, with the portion which had come into contact with the ground much decayed. This specimen was discovered in 1895, but was unfortunately given away to a collector a few years later. Dr. Hornaday remarks that this evidence renders it certain that the range of the musk-ox extended less than a century ago westward of the Mackenzie River along the Arctic mainland coast at least so far as the longitude of Point Barrow, in the extreme north of Alaska, where its extermination was doubtless brought about by the natives. Further south fossil skulls of musk-oxen were obtained by Sir F. W. Beechey during the voyage of the *Blossom* (1825–28), and subsequently by Capt. Kellet and Lieut. Wood from the frozen cliffs of Eschscholtz Bay, Kotzebue Sound, these serving to connect the recent New World members of the group with their extinct representatives in the Pleistocene deposits of northern Asia and Europe.

OVIBOS MOSCHATUS.

Bos moschatus, *Zimmermann, Geograph. Geschichte*, vol. ii, p. 86, 1780; *Huet, Bull. Soc. Acclim. Paris*, vol. xxxviii, p. 346, 1891.

Ovibos moschatus, *Blainville, Bull. Soc. Philom.* 1816, p. 76; *Desmarest, Mammalogie*, vol. ii, p. 492, 1822; *H. Smith, Griffith's Anim. Kingdom*, vol. iv, p. 373, 1827; *Richardson,*

Fauna Bor. Amer. p. 275, 1829; *Jardine, Nat. Libr. Mamm.* vol. iv, p. 189, 1836; *Ogilby, Proc. Zool. Soc.* 1836, p. 137; *Gray, List Mamm. Brit. Mus.* p. 153, 1843, *Cat. Ungulata Brit. Mus.* p. 43, 1852, *Cat. Ruminants Brit. Mus.* p. 32, 1872, *Hand-List Ruminants Brit. Mus.* p. 101, 1873; *Gerrard, Cat. Bones Mamm. Brit. Mus.* p. 231, 1862; *Rütimeyer, Abh. schweiz. pal. Ges.* vol. iv, p. 103, 1877; *Thomas, Bull. Soc. Zool. France*, 1881, p. 25; *Dawkins, Brit. Pleist. Mamm.* pt. v (*Pal. Soc.*) 1872, *Quart. Journ. Geol. Soc.* vol. xxxix, p. 575, 1883; *Flower and Garson, Cat. Osteol. Mus. R. Coll. Surg.* pt. ii, p. 236, 1884; *Lydekker, Cat. Foss. Mamm. Brit. Mus.* pt. ii, p. 38, 1885, *Horns and Hoofs*, p. 5, 1893, *Wild Oxen, Sheep, and Goats*, p. 142, 1893, *Proc. Zool. Soc.* 1900, p. 832, *Great and Small Game of Europe, etc.* p. 310, 1901; *Flower and Lydekker, Study of Mammals*, p. 357, 1891; *Nehring, Tundren und Steppen*, p. 31, 1890; *Newton, Vertebrata of Pliocene Deposits of Britain* (*Mem. Geol. Surv. United Kingdom*), p. 22, 1891; *Feilden, Zoologist*, ser. 3, vol. xix, p. 41, 1893; *Rhoads, Proc. Ac. Philad.* 1895, p. 242; *Ward, Records of Big Game*, p. 260, 1896, ed. 6, p. 353, 1910; *Matschie, Sitzber. Ges. nat. Freunde*, 1898, p. 30; *Lönnberg, Proc. Zool. Soc.* 1900, pp. 142, 686; *Allen, Bull. Amer. Mus. Nat. Hist.* vol. xiv, p. 72, 1901; *Elliot, Synop. Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. ii) p. 48, 1901, *Check-List Mamm. N. Amer.* (*op. cit.* vol. vi) p. 55, 1905; *Stone and Cram, Amer. Anim.* p. 65, 1903; *Henz, Rep. Smithson. Inst.* 1903, p. 611; *Andrews, Proc. Zool. Soc.* 1905, vol. i, p. 56; *Kowarzik, Römer and Schaudinn's Fauna Arctica*, vol. v, p. 98, 1909, *Zool. Anz.* vol. xxxvii, p. 106, 1911; *Pocock, Proc. Zool. Soc.* 1910, p. 857; *Hornaday, Bull. N. York Zool. Soc.* No. 45, 1911.

Bubalus moschatus, *Owen, Quart. Journ. Geol. Soc.* vol. xii, p. 124, 1856, *Anat. Vertebrates*, vol. iii, p. 626, 1868.

Bosovis moschatus, *Kowarzik, Zool. Anz.* vol. xxxvii, p. 107, 1911.

Musk-ox.

Typical locality Churchill Valley, Kewatin, Canada.

General characters those of the genus. Height at shoulder about four feet. General colour varying from dark brown, with the head, neck, and sides of body blackish, and typically a yellowish white dorsal saddle, to nearly or completely black. Horn-bases relatively wide. Distribution co-extensive with that of the genus.

A.—Ovibos moschatus moschatus.

Ovibos moschatus typicus, *Ward, Records of Big Game*, ed. 6, p. 354, 1910.

Typical locality Churchhill Valley, Kewatin, Canada.

General colour relatively dark, especially on the head, which, with the exception of the muzzle, is wholly dark

brown, without white on the face and any appreciable mixture of grey elsewhere. Kowarzik's statement that there is no lachrymal pit in the skull of this and the three following races is referred to under the heading of the species and also below.

The reference to the present race of some of the undermentioned specimens is provisional.

57. 3. 13. 2. Skin, in bad condition. Arctic America. *Presented by Sir George Simpson*, 1857.

612, *b*. Skin, immature, mounted. Arctic America. *No history.*

77. 3. 12. 2. Skin, mounted, of a four-year old male. Grinnell Land, lat. 81° 2′ N.; collected during Arctic Expedition. The face is wholly brown. *Presented by Lieut.-Col. H. W. Feilden*, 1877.

78. 6. 26. 10. Skin, mounted, and skull. Discovery Bay; collected during Arctic Expedition. *Presented by H. C. Hart, Esq.*, 1878.

78. 6. 26. 11. Head, mounted. Same locality and collection. *Same history.*

3. 5. 5. 1. Skin, mounted. Barren Grounds, Canada. *Presented by David T. Hanbury, Esq.*, 1903.

90. 9. 7. 1. Skeleton, with horns, mounted. Liverpool Bay, north-west British America. In the skull the lachrymal shows a hollow only in its vertical portion. *Presented by the Earl of Lonsdale*, 1890.

53. 9. 20. 1. Skeleton, with horns, mounted. Arctic America. *Presented by Dr. J. Rae*, 1853.

55. 5. 14. 8. Skeleton, with horns, mounted. Arctic America; collected by Dr. J. Rae. *Purchased*, 1855.

55. 5. 14. 4–5. Skin, and skeleton, with horns, mounted, female. Same locality and collector. *Same history.*

55. 5. 14. 5–6. Skin, with horns, and skeleton. Same locality and collector. *Same history.*

69. 2. 28. 1–2. Two skulls, with horns, female. Arctic America. *Presented by A. G. Dallas, Esq.*, 1869.

* * * *. Skull, with horns, female. Locality unknown. *No history.*

94. 11. 27. 1. Skull, female. Locality unknown. *No history.*

4. 1. 23. 1. Skull, with horns. Hudson Bay. The hollow in the lachrymal bone extends on to the facial surface, and thus seems to be a true lachrymal pit.

Presented by Alexander Gray, Esq., 1894.

B.—Ovibos moschatus wardi.

Ovibos moschatus wardi, *Lydekker*, *Nature*, vol. lxiii, p. 157, 1900, *Proc. Zool. Soc.* 1900, p. 832, *Great and Small Game of Europe, etc.* p. 314, 1901; *Nehring*, *Sitzber*, *Ges. nat. Freunde*, 1901, p. 151; *Sordello*, *Atti Soc. Ital.* vol. xxxix, p. 257, 1901; *Elliot*, *Synop. Mamm. N. Amer. Suppl.* (*Zool. Publ. Field Mus.* vol. ii) p. 485, 1901, *Check-List Mamm. N. Amer.* (*op. cit.* vol. vi) p. 56, 1905; *Kowarzik*, *Römer and Schaudinn's Fauna Arctica*, vol. v, p. 102, 1909; *Ward*, *Records of Big Game*, ed. 6, p. 354, 1910.

Ovibos wardi, *Allen*, *Bull. Amer. Mus. Nat. Hist.* vol. xiv, p. 71, 1891.

Ovibos pearyi, *Allen*, *loc. cit.*

Bosovis wardi, *Kowarzik*, *Zool. Anz.* vol. xxxvii, p. 107, 1911.

Typical locality East Greenland.

General colour, including that of horns, lighter than in typical race, with a whitish face-spot, and ears and whole front of head more or less grey instead of entirely dark brown; basal portion of horns much narrower and different in shape, the maximum width being about one-fourth less; hoofs narrower and less curved, with a much narrower interval between the fore part of their adjacent borders.

Full measurements are given by Allen, *op. cit.*

According to Allen, the distributional area probably extends from the southern border of Ellesmere Land northwards through Grinnell Land to the Polar Sea, and on the coast of Greenland from about lat. 75° on the westward side and northwards round the Polar extremity of the country to about lat 73° on the east coast. The Grinnell Land specimen in the collection, No. 77. 3. 12. 2, is, however, essentially of the *m. moschatus* type.

0. 12. 20. 1. Skin, female, mounted. East Greenland. Type. *Presented by J. Rowland Ward, Esq.*, 1900.

0. 2. 14. 1. Skin, and skull, immature. East Greenland. *Presented by the Duke of Bedford, K.G.*, 1900.

C.—Ovibos moschatus niphœcus.

Ovibos moschatus niphœcus, *Elliot, Proc. Biol. Soc. Washington*, vol. xviii, p. 135, 1905, *Check-List Mamm. N. Amer.* (*Zool. Publ. Field Mus.* vol. vi) p. 56, 1905; *Kowarzik, Römer and Schaudinn's Fauna Arctica*, vol. v, p. 110, 1909.

Bosovis niphœcus, *Kowarzik, Zool. Anz.* vol. xxxvii, p. 107, 1911.

Typical locality about 600 miles north of Hudson Bay.

General colour deep black, with a narrow whitish band between the ears behind bases of horns, and a small brown dorsal saddle; fore-legs greyish in front, black behind, passing into greyish white above hoofs; hind-legs black in front, shading into grey above hoofs, but greyish on sides and behind; nose, lips, and chin greyish white; ears black; long black body-hair reaching to knees and hocks; horn-bases relatively narrow.

No specimen in collection.

D.—Ovibos moschatus melvillensis.

Ovibos moschatus melvillensis, *Kowarzik, Zool. Anz.* vol. xxxiii, p. 617, 1908, *and Römer and Schaudin's Fauna Arctica*, vol. v, p. 113, 1909.

Bosovis melvillensis, *Kowarzik, Zool. Anz.* vol. xxxvii, p. 107, 1911.

Typical locality Melville Island.

Typified by a skull and horns in the K. Zool. Museum der Landwirtschaftlichen Hochschule, Berlin, with which its describer associates Parry's figure of a living animal, doubtless drawn from the specimen entered below.

According to its describer, this race is characterised by its very dark colour, and the total absence of any trace of white on the upper lip and the margin of the lower lip; the limbs being also wholly dark, whereas they are stated to be lighter in front in all the other races. Calves are stated by Parry to be lighter, and to show in some cases a whitish saddle.

Kowarzik states that the bases of the horns are relatively wide, and present other distinctive peculiarities, and that the nasals are wider than in the typical race, while the face narrows more markedly towards the muzzle. The

absence of a lachrymal pit is also regarded by its describer as a characteristic feature of this race.

The specimens in the collection are insufficient to afford decisive evidence as to the right of the Melville Island musk-ox to rank as a separate race, although on geographical grounds its distinctness is highly probable.

612, *a*. Skin, mounted. Melville Island; collected during the voyage of Capt. E. Parry, and described and figured on page 257 of Parry's "Journal of a Voyage for the Discovery of a North-west Passage in the Years 1819–20," London, 1821. Co-type.

Presented by the Admiralty about 1821.

612, *a'*. Skull, with horns, provisionally referred to this race. Figured in Gray's *Cat. Ungulata Brit. Mus.*, 1852, pl. v, and stated to have been collected during the Parry Expedition. (?) *Same history.*

612, *b*. Skull, with horns, imperfect. Obtained at same time as last. *Same history.*

E.—Ovibos moschatus mackenzianus.

Ovibos moschatus mackenzianus, *Kowarzik*, *Zool. Anz.* vol. xxxiii, p. 617, 1908, *Römer and Schaudin's Fauna Arctica*, vol. v, p. 116.

Ovibos mackenzianus, *Kowarzik*, *Zool. Anz.* vol. xxxvii, p. 107, 1911, *Denks. K. Ak. Wiss. Wien.* vol. lxxxvii, p. 58, 1912.

Typical locality Mackenzie district.

Typified by the skin and skull of a male from Great Slave Lake and a skull and skeleton from Great Bear Lake; the latter of these, at least, being in the Museum für Naturkunde, Berlin.

Kowarzik describes this race as follows:—General colour dark brown; in middle of back a yellowish saddle, from either end of which runs a dark stripe, reaching in front to highest point of back; on neck brown hair-tufts, with yellowish tips; forehead dark brown to black; lips yellowish, without white; region round eyes with light brown hair; flanks blackish brown; under-parts black; front of fore-legs above hoofs yellowish mingled with light brown, but superiorly blackish brown; hind-legs dirty yellow above hoofs, passing superiorly into dark brown. Horns with bases

wider than in any other race, directed much outwards at first, and narrowing rapidly at tips; in colour brownish to dark brown, with black tips, thereby differing from the yellowish horns of the other races. Basioccipital more quadrangular than in other American races;* a deep lachrymal pit; two teats in female;† upper row of cheek-teeth strongly arched (in place of nearly straight); spheno-maxillary fossa much behind end of molar series.

No example in collection.

* The description of this region is much mixed up with that of European Pleistocene skulls.

† Only a male skin referred to in description.

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